

From:

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Partners in Prosperity:

Strategic Industries

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Chapter 8

The Trigger Method

Parts I and II have introduced many of the factors responsible for an industry's strategic impact. This chapter organizes those indicators into a technique to be used by government officials, businesspeople, industrial analysts, and others interested in evaluating strategic sectors or technologies. I refer to this procedure as the "Trigger Method." This chapter explains the method in detail after summarizing the basic elements of a strategic industry.

A Systems Approach to Determining Strategic Industries

It is time to refine the argument and to show how it might be applied.

Historians suggest that some industries in a given time and

Chapter 8 of this book introduces a procedure for identifying strategic industries and evaluating their impact. Advice on the use of the Trigger Method is part of the consulting services of the author and his associates. An application for a service and trademark registration of the Trigger Method by Julian Grosser is pending. Inquiries regarding the Trigger Method should be referred to the author or to his counsel, Charles R. Brainard, c/o Kenyon and Kenyon, 1 Broadway, New York, N.Y. 10004.

place have been the primary cause of economic growth. I call these strategic industries. Time and place are critical conditions because the strategic importance of an industry depends on the circumstances of the host country, and even, I shall show, on regional blocs.

Government action is critical to the destiny of many strategic industries. Governments can promote industries to strategic candidacy, and governments may declassify industries. In some cases, a country may sense that a given industry is strategic but fail to capture its benefits by the ineptness of its approach. As late as the 1970s Great Britain was the second largest source next to the United States of industrial inventions, yet it failed to commercialize many of them.¹ Sometimes government leaders mistakenly believe that an industry is strategic and favor it to the detriment of an even more important sector. David Landes shows how, despite all impediments, cotton surpassed wool in its impact on growth during an important period of the industrial revolution in England.

The influence of an industry on aggregate economic growth is determined by the action of critical indicators. These core characteristics are in large part empirically based and can be found in the historical record. No core characteristic should be designated unless strong independent historical support is found for it.

An increasingly important element of many, although by no means all, strategic industries is their reduction of the costs of communications, information, and transportation. Similarly many, although again not all, strategic industries are at the forefront of technological change. Strategic industries are not limited to the capital goods sectors. As the example of nineteenth-century Denmark shows, agriculture can be a strategic industry in some cases.

A critical mass of many of the key variables and their synergistic actions is largely responsible for a strategic industry's influence on economic growth. A strategic industry need not possess all these characteristics, but it must possess a critical core.

The core characteristics themselves vary in importance de-

pending on time and circumstance. Throughout the period of their influence, however, these factors can be sufficiently powerful to cause the industry to be a significant stimulus to economic growth.

Industries can be arranged along a spectrum, some exhibiting more of the core characteristics and some less. There may be degrees of strategic leverage.

Industries will vary in their degree of strategic leverage. They can become more or less strategic. New strategic industries will appear, and others will no longer deserve the name. A preliminary study of nuclear power suggests that this industry may have been strategic for the United States in the 1960s, although clearly it is no longer so.²

Some industries are important but not strategic. The U.S. automobile industry is very important if only because of the number of people it employs. But it might not be strategic according to my criteria. The automobile industry was clearly strategic to the United States during the early part of the twentieth century.³

Some industries, although not strategic in themselves, perform important functions for other industries. Nørregaard Rasmussen notes:

It should not be overlooked that in many cases the term a "key industry" is used in a sense widely different from the one mentioned above. In certain cases the term is used when relating two industries no. i and no. j to one another. Industry no. i is then termed a "key industry" for industry no. j if the production in the latter industry is technically dependent on the products of the former industry. In this sense the iron ore industry is a "key industry" in relation to the steel industry. Within the framework of the present model this definition would involve that in the marginal case a certain industry has all the remaining industries as "key industries," or in general the "key industries" for industry no. j would be all those industries, for which $A_{ij} > 0$, $i = 1, 2, \dots, m, A/$

The demand of the U.S. automobile industry for robots serves an important function for the development of the robotics

industry, possibly a strategic industry, as well as a host of other industries.

It is not productive to speculate about which industries are strategic and which are not. A satisfactory answer can be derived only by careful analysis of the core variables and others to be identified as this concept is refined.

The Method

By the following ten-step method, the reader should be able to gauge the strategic leverage of any industry past, present, or future. The first six steps are descriptive and analytic, and are illustrated by the example of the American cotton textile industry in the early nineteenth century. Chapters 4 to 7 have already explained how decision makers in Japan, although not employing the proposed method, are using many of its principles to plan the development of strategic industries to the end of the twentieth century and the beginning of the twenty-first. Chapter 9 describes the final three evaluative steps of the method.⁵

Step 1: Defining the Industry

The first problem in designating an industry as strategic is to determine the boundaries of the industry itself. Chapter 9 addresses the question of *who* should make this decision. The present discussion is concerned with the methodology of definition.

Particularly in capital goods industries, intermediary technological changes often determine the qualities and direction of economic growth. Nathan Rosenberg suggests that in such cases we must rethink our basic notions of an industry as defined by product lines, and begin to focus on interindustry relationships and intraindustry technological flows.

Any consideration of the textile industry would be artificial which did not include the chemical, plastics, and paper industries. Con-

sideration of the machine tool industry must now take into account the aerospace, precision casting, forging, and plastics forming industries. These industries are now complex mixtures of companies from a variety of SIC categories, some functioning as suppliers to the traditional industry, some competing with it for end-use functions and markets. "The industry" can no longer be defined as a set of companies who share certain methods of production and product-properties; it must be defined as a set of companies, interconnected as suppliers and market, committed to diverse processes and products, but overlapping in the end-use functions they fill. We can talk about the "shelter" industry and the "materials forming" industry, but we cannot make the assumptions of coherence, similarity and uniformity of view which we could formerly make in speaking of "builders" or "machine tool manufacturers." Similarly, companies are coming to be less devoted to a single family of products and manufacturing methods, and more a diverse conglomerate of manufacturing enterprises, stationed around a central staff and bank, and to some extent overlapping in the markets and functions they serve. These changes are part and parcel of the process of innovation by invasion.⁶

Rosenberg finds in input-output analysis a powerful tool to look inside the "black box" that conceals how the primary factors of production, capital, and labor are transformed into a final flow of output.

The technique makes it possible to study the process of technological change by examining changing intermediate input requirements, by looking, that is, . . . at the coal and ore and steel and chemicals and fibers and aluminum foil; sausage casings, wire products, wood products, wood pulp, electronic components, trucking, and business services that establishments furnish to each other. . . . Many aspects of technological change are visible only at this intermediate level.⁷

Only by examining these intra- and intersectoral relationships at the intermediate levels of production can we begin to grasp the causes of technological change.

Input-output information enables us to predict that cost-reducing technological changes in some sectors are likely to have wider-

range repercussions than similar changes in other sectors. It highlights the pervasiveness of cost reductions in such sectors as transportation, energy, services, and communications, and makes it possible to identify and assess the relative significance of such cost reductions in different sectors of the economy. But the problems are far more subtle and complicated and revolve around the essential fact that technological progress in one sector of the economy has become increasingly dependent upon technological change in other sectors. That is to say, technological problems arising in industry A are eventually solved by bringing to bear technical skills and resources from industry B, C, or D. Thus, industries are increasingly dependent, in achieving a high rate of productivity growth, upon skills and resources external to, and perhaps totally unfamiliar to, themselves.⁸

The problem of interindustry relationship or flows is less acute in non-capital goods sectors, although they may still be important. The task is to identify as precisely as possible the core of the industry that appears chiefly responsible for economic growth.

After determining the appropriate technological boundary of the industry, the next problem is to describe it in time and place. If the object is to describe a past or present strategic industry, the decision maker must pinpoint the time period and the geographical area where the industry first began to exhibit its strategic character, how this character changed, and when it began to decline. This will require careful assessment of each stage in the life cycle of an industry. Because the flow of technology may change over an industry's life cycle the definition of the industry itself may need to be revised.

Step 2: Assessment of Economic Indicators

The second step is to assess the target industry from the vantage of specific economic indicators. Some indices can be supported by data easily obtained from historical studies or current statistics. Others may require new in-depth research.

GENERAL INDICATORS

The general indicators (outputs and inputs) are high rates of: (1) growth, (2) exports, (3) employment, and (4) productivity gains. In comparison with other industries, strategic industries display these general indicators at some period in their life cycle. These high rates probably will not all occur at the same time. Productivity gains resulting from technological change may precede spurts in growth, while rising employment and exports may often accompany or be consequences of increasing growth rates.

RESEARCH, INVENTION, AND INNOVATION

Many, although not all, strategic industries involve a substantial commitment to (5) research. In the last forty years such research has been conducted in corporate laboratories. The research was far less institutionalized than it is now, although even then the industries' leaders appear to have been interested in probing technology's frontiers.

Strategic industries also tend to have (6) high levels of investment in human capital. Rosenberg stresses this important variable:

Much of society's "investment" (if the term is used in the only meaningful sense of any current use of resources which increases future output) consists in investment in human capital; and a significant portion of the apparent discrepancy between the growth in output per capita and the growth in measured inputs, referred to earlier, is attributable to the exclusion of all capital which becomes embodied, so to speak, in the human agent. Such investments become increasingly important as an economy achieves higher levels of per capita income and it is apparent that the failure to include the expenditure of resources upon such activities as formal education and on-the-job training has imparted a major downward bias to our measure of capital formation and to our measures of growth-inducing forces generally.⁹

They also exhibit (7) high rates of invention and innovation: "Strategic industries display high rates of invention and

the commercialization of these inventions (innovation). As suggested by the machine tool industry there is often a positive feedback between the two. Innovations create a market and a demand that stimulates invention."¹⁰ Invention opens new opportunities for the canny entrepreneur. The process is usually incremental, but in the aggregate, of great importance.

ECONOMIES OF PRODUCTION

Economies of production include economies of (8) scale, (9) specialization, (10) scope, and (11) the learning curve and the product life cycle.

Strategic industries generally display sharply increasing economies of scale; in other words, an increase in output per factor of production (productivity) as a function of scale. As with machine tools in the nineteenth century, such increases in productivity are often more the result of specialization than scale. At times, however, as in the early 1950s in the Japanese petrochemical industry, one industry can capture both type of economies. The synergetic action of many factors tends to multiply the benefits of economies of scale and specialization over time (dynamic economies) and in other sectors of the economy.

As was seen in the discussion of flexible manufacturing in Chapter 5, "economies of scope" may increasingly be an important condition for some future strategic industries. Today an initial investment is amortized by the mass production of identical parts. In some emerging industries, such as flexible manufacturing, the same level of investment can be recouped by production of an equal or greater volume of different parts or of the deployment of the same part in multiple uses.

(11) The learning curve and the product life cycle. The learning curve refers to the relation between labor costs and output as a function of experience. After an initial increase, labor costs generally decline as a result of workers' acquaintance with their tasks. The semiconductor industry displays a steep declining learning curve associated with mass production of memory chips; the aircraft industry, a more gently

declining learning curve that reflects batch production. The learning curve appears particularly important in some strategic industries.¹¹

A related notion is the product life cycle. In strategic industries the product life cycle tends to be shorter than in other industries, and, the industry's products tend to turn over at increasing rates. This in turn can effect a shift downward in the learning curve. The semiconductor industry displays this phenomenon. For example, in product life cycles, A, B, C, \dots, n , the learning economies of C influence B , B influences A , and so on to the n th permutation. As suggested by the development of the machine-tool industry in the nineteenth century, these economies are augmented by the increasing specialization, complexity, and differentiation that characterize strategic industries.¹²

STRUCTURAL FACTORS

(12) Vertical Integration. Strategic industries often become vertically integrated, in part as a response to technological convergence. This is perhaps best exemplified by the development of the Japanese semiconductor and computer firms that grew from divisions of the early telecommunications companies and in response to the needs of their communications industry.¹³

However, a strategic industry may be "vertically disintegrated" as was the machine-tool industry in the early days of its development in nineteenth-century America.

Step 3: Technical Indicators

DUAL USE

Most strategic industries, although not all, include technologies that have both civilian and military uses. Military uses involve defense, offense, or some other strategic deployment, usually dependent on early availability for use as weapons. In most cases the state of the art is in the military application; but in other cases, such as semiconductor memory chips, it may lie in commercial applications.

CORE TECHNOLOGY

Often a core group of technologies plays a critical technological and/or economic role within a strategic industry. In the late 1970s the 64k random access memory (RAM) occupied not only the technological frontier of critical memory components, but because of its suitability for mass production it also constituted an important source of revenue for the industry. Such technologies possess "strategic functions" that mirror, on a lesser scale, the functions of the industry as a whole.

FRONTIERS OF SCIENCE AND TECHNOLOGY

Some high-technology industries such as robotics, semiconductors, and genetic engineering are generating a disproportionately larger percentage of fundamental advances in science and technology, in part because of their commitment to research. As suggested by the history of machine tools, these industries often are guided by a core group of technologies with diverse applications. The strength of users' demands and the versatility of applications have often assured the rapid diffusion of scientific and technological advances to other sectors.

KNOWLEDGE (INFORMATION) INTENSIVE

Strategic industries have often been closely allied with communications. The railroads created a national market and, in concert with the steamship, an international market. The semiconductor, computer, intelligent robots, telecommunications, and even bioengineering are today's information-processing or communications industries. As discussed earlier, the economic properties of information contribute largely to the strategic functions played by these industries.

TECHNOLOGICAL CONVERGENCE

Nathan Rosenberg's study of the American machine-tool industry in the nineteenth century is a good example of tech-

nological convergence. The phenomenon is also well illustrated in the convergence between the computer and semiconductor industries, exemplified in the microprocessor (computer), the overlap between telecommunications and computer networks, and the increasing integration between biology and the information industries in the new field of bionics.¹⁴

COMPLEMENTARIES, INTERDEPENDENCE, AND THE CONCEPT OF TECHNICAL IMBALANCE

In history the productivity of an invention has often turned on the availability of a complementary technology. Enjoyment of the benefits of A had to await inventions B, C, or D. In the past the reduction in the cost of power generation proved critical to the aluminum industry and affected the extent to which fertilizers reduced the costs of food production.

A related notion is "technical imbalance." Often an improvement in one part of a system is constrained by another part of the system. The improvement creates an imbalance placing a "strain" on other parts. This in turn induces changes that make the system as a whole more efficient. The operation of an audio system illustrates this idea.

The auditory benefits of a high-quality amplifier are lost when it is connected to a low-quality loudspeaker. Edison, and later Westinghouse, well understood the idea of technical imbalance in their development of the electrical power industry in the United States.

SYNERGISMS

I use the word synergism in its biological sense: A potentiates B and is itself thereby enhanced, so that the combined potency of A and B exceed their individual effects. Rosenberg's description of the changes in the machine-tool industry is a good case of synergism. Synergism differs from linkage in that it describes a more precise and technical interaction between technologies, suppliers, and industries.¹⁵

COMPLEXITY AND DIFFERENTIATION

It has been suggested that an important index of technological capability is complexity (the number of parts). For example, countries with less-developed industrial bases generally manufacture machines involving fewer than 5,000 parts; countries at an intermediate level 5,000–50,000 parts; and those at the highest level manufacture machines using 50,000–2,000,000 parts. Only the U.S., it is alleged, has this capacity.¹⁶

Step 4: Social and Political Indicators

GENERALIZABLE PATTERN OF PRODUCTION

Strategic industries often introduce a new pattern of production that is thereafter generalized throughout the economy. The factory is introduced with the cotton industry in England in the eighteenth century. Henry Ford introduces the mass production of automobiles. Today computer-controlled integrated systems of intelligent robots and machine tools are fundamentally reshaping production. Although less easily described or quantified, such basic changes in how human beings organize their work can be as important to a strategic industry as any of its more technical characteristics.

GENERALIZEABLE PATTERN OF COMMERCE

In addition to its general legacy for economic growth, banking at Bruges and the Italian city-states in the fourteenth and fifteenth centuries created general principles and practices of commerce that continue in many cases unchanged today. The partnership, the branch office, double entry book-keeping, bills of exchange, marine insurance, and other major evolutionary steps in the development of mercantile law all date from this period.¹⁷

RELATION TO OTHER CRITICAL NATIONAL POLICY OBJECTIVES

In the eighteenth century there was little relation between the early growth of cotton and Britain's national objectives.

Cotton simply broke through naturally, an unbound Prometheus.¹⁸ Some strategic industries, however, have had a close relation to government's objectives in other sectors. The best example is the German chemical dye industry that well served the Third Reich's ambitions for conquest.¹⁹ A critical feature of Japan's strategic industries today is the perception of some ministries of their contribution to energy conservation, pollution control, technological development, productivity, labor relations, and international political adjustment.

NATIONAL PERCEPTIONS OF WEALTH, PRESTIGE AND POWER

Governments have almost always come to perceive strategic industries as critically important either for prestige, military prowess, scientific advance, or economic success. The interesting question is whether this perception and the consequent preferments that often accompany designation are what *make* the industry strategic, or whether there are forces at play independent of governmental action. The cotton industry in England seems to support the latter hypothesis, since cotton grew and flourished despite sumptuary laws against it, and national dispensations to wool. This in no way discounts the significance of a government's perceptions of the importance of an industry, nor those of the public. National perceptions are always important in the evaluation of an industry's strategic significance.

SCALE RATIOS OF SOCIETY

Strategic industries often have dramatic, at times even sudden, changes in the human, mechanical, and informational scale ratios of society.²⁰ Change a person's life expectancy from 35 to 75, the onslaught of adulthood from 12 to 20, communicative skills by voice or gesture, the hours of sleep, and you dramatically affect economic performance. These are the human-scale ratios.

Consider the changes on land from donkey to convoy, on sea from the barge of Hatshepsut to the supertanker, the development of air transport, and you find shifts that dramatically influence economic growth. These are the mechan-

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ical scales, measured in volume and speed, that pertain to the movement of goods. Finally, consider the transformation involved from the smoke signal to the computer and then to the satellite. These are the scales of communication, measured in bytes, distance, time, and cost. Each major change in the scale ratios of society alters the size and dominance of the social group, the generation and distribution of wealth, and the configuration of land, sea, and air relationships.

Step 5: Secondary and Tertiary Effects

Strategic industries have characteristic secondary and tertiary effects during their life cycle. When concerned with an existing or future strategic industry, we must attempt to predict these effects. They are substantially clear in the analysis of strategic industries of the past.

HIGH MULTIPLIER

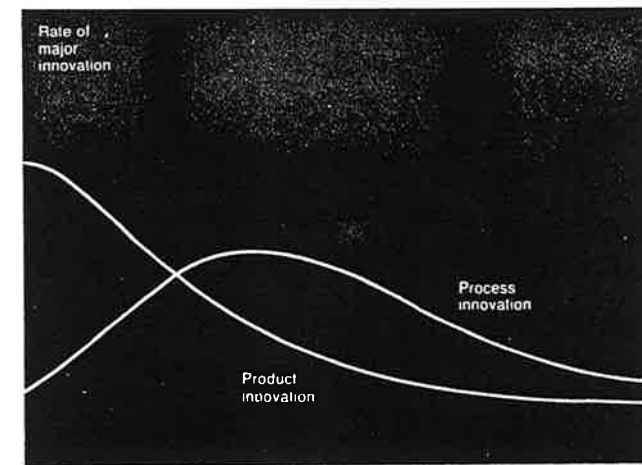
An important element is the rapid rate of purchase or use by other industries of revenues generated or output of the strategic industry. Forward and backward linkages are examples of the multiplier in a specific sectoral direction. Strategic industries exhibit high multipliers initially through these sectoral pathways.

DEEP "PENETRATION" OF INPUT-OUTPUT MATRIX

Strategic industries often involve a sharp reduction in cost that is distributed broadly throughout the input-output matrix of an economy. One of the key breakthroughs in the history of British coal was the sharp reduction in fuel costs. With the development of the coal industry, reductions in fuel costs were captured soon after in glass, brick, lime, and metal making. Analogous economies are evident in the ways the railroad helped to reduce the costs of transportation and communications in other industries, and in agriculture.

Some industries, particularly capital goods sectors, penetrate the input-output matrix through technology. A good example is copper wire. An example from high technology

The Pillars of National Industrial Recovery



	Fluid pattern	Transitional pattern	Specific pattern
Competitive emphasis on	Functional product performance	Product variation	Cost reduction
Innovation stimulated by	Information on users' needs and users' technical inputs	Opportunities created by expanding internal technical capability	Pressure to reduce cost and improve quality
Predominant type of innovation	Frequent major changes in products	Major process changes required by rising volume	Incremental for product and process, with cumulative improvement in productivity and quality
Product line	Diverse, often including custom designs	Includes at least one product design stable enough to have significant production volume	Mostly undifferentiated standard products
Production processes	Flexible and inefficient; major changes easily accommodated	Becoming more rigid, with changes occurring in major steps	Efficient, capital-intensive and rigid, cost of change is high
Equipment	General-purpose, requiring highly skilled labor	Some subprocesses automated, creating "islands of automation"	Special-purpose, mostly automatic with labor tasks mainly monitoring and control
Materials	Inputs are limited to generally-available materials	Specialized materials may be demanded from some suppliers	Specialized materials will be demanded; if not available, vertical integration will be extensive
Plant	Small-scale, located near user or source of technology	General-purpose with specialized sections	Large-scale, highly specific to particular products
Organizational control is	Informal and entrepreneurial	Through liaison relationships, project and task groups	Through emphasis on structure, goals, and rules

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is the semiconductor, now an indispensable component in a wide spectrum of other industries.

The concept of penetration and the idea of forward or backward linkages are closely similar—and in some cases may be identical—in that the deeper the penetration, generally the greater the linkage-multiplier-feedback effect. A possible distinction may be that linkages imply both reduction in the costs of supplying a given input and also an *increase in demand* for the output of an industry or its linked industries.

FORWARD AND BACKWARD LINKAGES

Strategic industries display forward and backward linkages in both an economic and technical sense. Just as the railroad engendered the growth of agriculture (forward linkage) and stimulated the coal and iron industries (backward linkage), so today rapid advances in semiconductor technology are changing the size, design, and uses of computers (forward technical linkage), while also increasing the demand for new materials such as gallium arsenide (backward economic and technical linkage).

HIGH RATE OF FEEDBACK

Forward linkages are often in a dynamic relation that Albert Hirschman has termed “pincer cum feedback”:

Thus it is quite possible for industry A to be established as a result of final demand for its products crossing the threshold, and then for B to follow suit not only because of demand factors, but also because B intends to use A's products as a principal input. Such a development has a particularly dynamic quality, because it necessitates an expansion of industry A, which was originally set up only in response to final demand and must now satisfy new industrial customers as well. In other words, while the existence of industry A helps to induce the establishment of industry B, this establishment in turn induces the building of new capacity for A.²¹

The feedback may be technical as well as economic, with technological innovations in “downstream” industries influencing technical changes in the “upstream” suppliers.

As noted, strategic industries involve high rates of product and process innovation. In general, a strategic industry's life cycle is described by James Utterback and illustrated in Figure 2. A firm finds an initial use for a major innovation in a small, often vacant market niche. Rising demand for its products and increasing costs and other factors tend to stimulate process innovation, which in turn calls forth new product innovations. A product innovation for one firm may often constitute a process innovation for another. James Utterback notes:

When one examines the relationship between various producer and user firms it quickly becomes apparent that, in this broader sense, most innovation is not product innovation at all, but contributes to productivity directly through the linkage of different firms in the physical flow of production to final demand.²²

Most process innovations tend to follow product innovations by several years, although the lag tends to shorten as a product becomes standardized.

Strategic industries in most respects follow Utterback's life cycle of product and process innovation. A major difference between strategic industries and other industries, however, is the speed and range of diffusion of technological change, first within the strategic industry itself and then to other sectors; and also the rate of feedback among the primary, secondary, and tertiary sectors.

Economic feedback is illustrated in the derived demand for the primary industry's products. Such demand can itself stimulate additional innovation. Technological feedback is illustrated by secondary or tertiary technological breakthroughs that either stimulate technological change in “upstream” sectors or become inputs of these sectors. Industrial feedback takes place when a principle developed in a linked sector is referred back and adopted by the primary sector. The historical relationship of innovation, diffusion, and feedback is discussed in Chapter 1.

High rates of innovation, diffusion, and feedback are as-

sociated with high rates of economic growth. The dynamic relation of product and process innovation, diffusion, and feedback loops suggests that governments employ different measures over the life cycle of any industry.

Step 6: High "External" Benefits, High "External" Costs

Strategic industries confer significant benefits to large segments of society, often far exceeding the market value of their products. To some extent such benefits can be quantified as indicated in Fishlow's study of the railroads. At the same time, these industries often impose significant adverse costs on large segments of the population. The air pollution of the Japanese kombinat in the 1950s and 1960s is a vivid example.

Usually there is a lag between the initial perception of the benefits of a strategic industry and a later realization of its costs. Often the distinction is exaggerated as government and industrial leaders tout these benefits and seek through legal and other means to depreciate their adverse consequences.

The benefits and costs of strategic industries also appear to have a distinct relationship to each other. In many industries the benefits and costs often rise gradually. In strategic industries, however, while the benefits are often immediately evident, the costs are not. Often these may appear in a sudden event. An example is a nuclear reactor. When operated safely, the reactor provides electricity to an entire city. With mishap, it brings catastrophe. At times the costs of a strategic industry appear silently and over a protracted period. This was the case of Minamata (mercury poisoning), itai-itai (cadmium poisoning), and related environmental diseases in postwar Japan.²³ This oscillation of benefits and burdens itself appears an important characteristic of strategic industries.

Steps 7 to 10 Summarized

By the Trigger Method policymakers should be able to identify and, if necessary, assist strategic industries. As explained in the next chapter, after an industry is analyzed

according to steps 1 to 6, the applicant submits an analysis to the Office of Strategic Industries. Next, the report is summarized and arranged in a matrix for purposes of comparison with other nominated industries. Each industry is then evaluated with respect to the economic, technical, political, and other indicators noted. This procedure raises the difficult problems of how to perform this assessment, how to weigh indicators with respect to each other, and how to integrate the nominal, ordinal, and cardinal values assigned into a final determination of an industry's strategic significance. Such decisions can be made only partially by technical analysis. Chapter 9 proposes that the ultimate decision about which industrial sector is strategic, and the extent of its strategicness, be determined by a negotiated agreement involving the targeted industry and other affected interests. The next section of this chapter illustrates the retrospective uses of the Trigger Method by the case of cotton textiles in nineteenth-century America.

Cotton Textiles in Nineteenth-Century America— A Historical Illustration of the Trigger Method

Between 1780 and 1840 the cotton textile industry of the eastern seaboard states served as a strategic industry for the region and, to a lesser extent, for the rest of the country. A value from one to ten is used to rate the industry with respect to each of the key indicators. The evaluation is based on an interview with J. W. Lozier, a historian of the industry.²⁴

Step 1: Definition of the Industry

We are concerned principally with three classes of cotton mills and their supporting managerial, marketing, and financial institutions: dispersed small rural mills, medium-sized mills of villages and cities, and clusters of big mills intensely operated at large water-power facilities.

Step 2: Economic Indicators

1. Rates of growth (10). After 1807 the cotton textile industry was the fastest growing sector in New England. Lozier estimates that between 1807 and 1815 the industry grew by over 300 percent. It continued in cycles of rapid growth throughout the period.
2. Rates of exports (1). Despite its high rate of growth, cotton textiles never developed into a significant export industry. England continued to dominate the international market until the late nineteenth century.
3. Rates of employment (10). Few industries employed as many people as did the cotton industry. Cotton mills were particularly a major employer of women: Lozier estimates that 75 percent of the workforce employed by the mills in Vermont were women and 81.4 percent in New Hampshire were women. Cotton mills contributed the first large-scale employment opportunity for women outside the home in other than domestic tasks.
4. Rates of productivity
 - (a) Labor productivity (10). Throughout the period cotton textiles demonstrated sustained high returns to labor. The mechanization of any process often doubled, tripled, or quadrupled the output of a single worker. A good example is mechanization of looms, in which each loom enhanced the output of a hand loom by between 300 percent and 400 percent.
 - (b) Capital productivity (4). Returns to capital were significantly less.
5. Rates of research and development (10). In the early 1800s few companies possessed institutionalized research laboratories. By contrast, however, cotton textiles involved a considerable amount of experimentation that kept the industry far on the technological frontiers of the period.

6. Rates of investment in human capital (8). In some cases jobs were eliminated as certain manual and other human skills were engineered into the machines. In this sense the industry required disinvestment in human capital. On balance, however, it demanded and created a new generation of skills and mechanical knowledge that other industries quickly incorporated into their own machinery.
7. Rates of invention and innovation (10). Cotton textiles was one of the leading sectors of invention and innovation. One index of new inventions is the comparative rates of new patent filings. Cotton textiles were a subject of intense interest and more new patents were filed here than in almost any other industry. The rate of new patents tracked the period of the industry's sharpest growth.
8. Economies of scale (10) and specialization (10). Lozier & notes that during the entire period there were no diminishing returns to scale. Clustered together, the large Lowell-type mill complexes also maximized the return on huge water power developments. Lozier notes: "Through their size and concentrations on one simple coarse product, these mills became so highly efficient that they could easily outcompete both British mills and smaller American mills."
9. Economies of scope. Economies of scope may be a product of the age of numerical control of production, more specifically flexible manufacturing, and for that reason are not applicable to this period.
10. Economies of scope. Economies of scope may be a product of the age of numerical control of production, more specifically flexible manufacturing, and for that reason are not applicable to this period.
11. Learning curve and the product life cycle (10). Product life cycle, particularly for the machinery sector, was very swift. In the mills of Dover, New Hampshire, some machinery was considered obsolete within five years.
12. Vertical integration (10) and disintegration (10). Cotton displayed a distinct and pronounced cycle first of vertical integration, and in the latter part of the period, of dis-

integration in Stigler's sense. About 1806 yarn manufacturers, finding it hard to sell yarn by itself, turned to hand weaving. Shortly after, hand weaving was brought into the factory to improve inventories and to control workers. Hand weaving itself was soon eclipsed by power weaving. While these events were taking place, each mill began to introduce and to specialize in its own machine shop. The mills of Providence are a good example of the proliferation of such small specialized machinery divisions.

The pattern of industrial fragmentation generally followed these lines. Some mills in the 1820s built their own machine shops. Soon they were producing machines for other mills. Later the larger, more capable mills, such as those in Taunton and Lowell, were manufacturing machines for industries unrelated to textiles, like railroads. By the 1840s some mills were so diversified they could no longer afford machine shops and spun these off as separate divisions, for example the bleach and dye works.

Step 3: Technical Indicators

DUAL USE (2)

In general there was little direct relation between the cotton and arms industries in nineteenth-century New England. Cotton cloth was of course used to clothe the armies, but this would hardly qualify the technology as "dual use." During the Civil War era, several large textile machinery shops, such as those in Chicopee, Manchester, and Taunton began to manufacture arms.

CORE TECHNOLOGY (10)

Advances in cotton milling in eighteenth- and nineteenth-century America were based on key technological breakthroughs that included the introduction of the Arkwright system of mechanical production of cotton thread (1791); the

addition of waterpower weaving (successfully introduced in 1814–1815); the Gilmore Scotch loom (1817); the massive engineering of water power at Lowell, Massachusetts (1822–1840). In addition, there were many core breakthroughs in the machine-tool shops within the larger mills that supported innovations in weaving.

SCIENTIFIC (2) AND TECHNOLOGICAL FRONTIERS (10)

The machinery shops of the cotton textiles industry served as a primary source of technological and scientific advances. As noted, various inventions and innovations were made in the use of water power, although these were primarily of technological, not scientific, character.

KNOWLEDGE INTENSIVE (8)

Although cotton textiles themselves did not maintain formal laboratories, the industry, particularly its machine-tool divisions, quickly became a transmission center, in Rosenberg's terms, a "pool or reservoir of skills and technical knowledge" for the entire economy.

TECHNOLOGICAL CONVERGENCE (8)

Technologies adapted to a specialized use in the mills were soon found to have other uses, and these principles were transferred and applied in other industries. Although machine building shops were the primary locus of convergence, Lozier notes a similar process in the adaptations of the technology of water power.

INTERDEPENDENCE (8)

Cotton textiles demonstrated a significant "push-pull" relationship as one technological advance stimulated another, while at times imposing bottlenecks on new developments. This was true generally of cotton textiles from the development of Kay's flying shuttle that greatly increased the output of weavers, which in turn created a bottleneck in spinning. This in turn was relieved by inventions of Hargreaves, Cartwright, and Arkwright that created a bottleneck in weaving.

The United States quickly outstripped England once the new technologies began to diffuse rapidly. Technological advances in spinning in the United States created pressures that could be resolved only in the development of power weaving. Thus in northern New England machines were quickly adapted to the production of coarse goods in large quantities, using highly integrated process. The emphasis here was on heavy power-spinning machines. The mule was rarely used in this area.

SYNERGISM (10)

David Landes notes that synergism was extremely important to the development of the textile industry, although it took primarily a financial rather than a technological form. Recognizing the importance of the new technologies, entrepreneurs of this period would first organize a closely held corporation, promote the stock within Boston and other cities, and wait for the price to rise. Then they would unload and organize a new corporation. At times the original promoters would continue to manage these businesses, although ownership was transferred to others more willing to invest for the longer term. The technique represented a major innovation of its day and offered essential financing to the mills at a critical point in their development.

COMPLEXITY, NUMBER OF PARTS, AND DIFFERENTIATION (10)

Cotton textile technology became increasingly complex and differentiated. The development of the ring frame and the spinning and self-acting mule are examples of the principle of increasing number of parts and complexity. Only at the end of the period when the industry began to settle down did standardization of parts and process become more significant.

Step 4: Sociopolitical Indicators

GENERALIZABLE PATTERN OF PRODUCTION (10)

Lozier notes: "The most important role of the textile industry in this country was that of a demonstration model for

the factory system. Although the paper, flour, and nail industries had something of a factory system early in the nineteenth century, it was the textile industry by its size and geographic range that personified the factory style to the public. Cotton textiles first legitimized, then popularized, the factory system for 19th century America."

GENERALIZABLE PATTERN OF COMMERCE (1)

Textiles did not introduce major new innovations in commerce. Actually, the industry was at the mercy of commission merchants.

RELATION TO OTHER CRITICAL NATIONAL OBJECTIVES
INCLUDING PERCEPTIONS OF WEALTH, PRESTIGE,
AND POWER (8)

In many ways the factory system was alien to late eighteenth-century notions of how industry should be organized. By the early nineteenth century, however, it had so impressed the country's leaders that cotton textiles were cited as all that was virtuous about Republican technology. The factories, it was said, put lazy people to work, inculcated good morals, and encouraged identity. Cotton textiles also helped keep money at home and encouraged economic independence, primary mercantilist objectives. Hamilton, and later the Jeffersonians, came to view cotton textiles as a prestige industry.

Step 5: Secondary and Tertiary Effects

HIGH MULTIPLIER (5)

In general terms the multiplier of cotton textiles was comparatively less important than that of other sectors, since profits for the industry remained relatively low. A fair amount of the revenues earned by the owners of mills and commission merchants who sold the goods of the mills went into economic development including canals, railroads, and other industries.

DEEP PENETRATION OF INPUT-OUTPUT MATRIX (8)

If the industry is characterized primarily by its capital goods sector, the tools of the machine shops become ubiquitous inputs in most other sectors. Cotton goods themselves were widely used and were a significant input in the commercial and household clothing industries.

LINKAGES

1. Backward technical linkages (10). Although backward economic linkages were also significant, they were not as pronounced as the industry's technological impact. Even at its heyday the industry consumed about 20 percent of southern cotton, the remainder being shipped to England. Other backward linkages included the demand for canals, turnpikes, railroads, and various public works projects.
2. Forward technical linkages (6). In response to the rising demand of other sectors, textile machinery manufacturers soon branched out into other lines such as locomotives, new machine tools, paper machinery, fire engines, pumps, mill work, stationary steam machines, sugar mills, and the like.
3. Forward economic linkages (4). The mills produced a new service industry of commission merchants who helped organize a whole range of other industries and contributed vitally to the cultural life of Boston and other major mercantile cities.

FEEDBACK (9)

The machinery divisions of the cotton textile industry displayed Hirschman's pincer-cum-feedback loop to some extent. Economic feedback was significant to the extent that it stimulated growth in other sectors that, in turn, increased the demand for cotton textiles.

Step 6: High External Benefits (10) and High External Costs (8).

Cotton textiles brought significant, although as yet unquantified, benefits and costs to American society. Among the benefits were the various technical and economic linkages already noted as well as some lesser secondary and tertiary effects. Lozier notes that reduction in the cost of cotton textiles permitted the average household to purchase more cotton goods and, what is significant, to change linen more frequently. This likely contributed to hygiene, in particular to the reduction in lice, which were a primary cause of typhus. Incidence of typhus and other vermin-related diseases dropped markedly at the end of this period.

The industry also imposed great hardships on some communities. The introduction of larger, integrated mills at Lowell eclipsed the smaller-scale mills of the periphery. The rapid turn to power weaving destroyed firms using other methods, and mechanized picking wiped out overnight the household picking industry. Cotton textiles also forced families apart and altered irrevocably a rural way of life. Lozier writes:

The cotton mill altered the life of rural Americans, particularly young women, by replacing highly social home spinning and weaving with less social factory labor. In the factory, while one might work with friends and family, the dispersion of machines, noise, demands on attention, and work rules against unnecessary conversation made socializing less frequent and more difficult. At home the eighteenth-century domestic spinner and weaver had enjoyed a large measure of control over the time and place of her labor, but the mill hand worked in a disciplined system where her hours and work location were dictated by machines, production lines, water supply, and management efforts to maximize the use of her capital. Instead of the familiarity of her own home, she had to stand at a demanding machine for 12 to 14 boring, noisy, lint-filled hours.

Although dislocations resulting from rapid technological change are not true "externalities," the industry imposed

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significant external costs as well. For example after 1850 brown lung disease resulting from the industry's pollution became a major health problem.

Scale Ratios of Society (not evaluated)

Cotton textiles dramatically affected the human, mechanical, and transportation scale ratios of nineteenth-century America. Although a gap existed between rich and poor in the eighteenth century, the separation was relatively low for most people. The mills substantially widened this gap, creating in their wake a class of economically rich people, the Lowells, the Cabots, Lawrences, Lees, Thorndikes, and others, who came to wield most of the political power throughout the region.

Summary

If the results of a full analysis of the cotton textile industry of early nineteenth-century America were condensed and registered in a matrix beside other industries of this period, cotton textiles would clearly qualify as a strategic industry.

Although it did not display all the core characteristics, it suggested most of them and did so to a significant degree.

Although the importance of some of these indicators changed over the period, a critical core was virtually always present. Lozier cites vertical integration, convergence, and backward technical linkages being among the most important variables, with the industry's greatest significance being the introduction of the factory system itself.

The primary importance of the machine-building divisions indicates the importance of "critical niches" within a strategic industry. The existence of this growing, increasingly important segment suggests some of the problems in defining a strategic industry and in evaluating the core indicators with respect to it.

Chapter 9

Planning Strategic Industries without Plans or Planners

Why Coherence in Government Is Necessary

The time is at hand when the politicians and business and labor leaders must choose between coherence or a jangle of disparate voices each claiming a preference incompatible with the next. There are three reasons why coherence today is imperative.

First, the times themselves have changed. Thirty years ago it mattered little whether other countries protected their home markets. The United States bestrode the world like a colossus, and distortions in trade had only marginal effects on U.S. competitiveness. Today the balance of power has shifted and the interference of other countries in the free flow of technology, goods, and information places a premium on a firm's and a nation's ability to adjust. Incoherence cripples adjustment.

Second, when ordinary industries falter, the consequences may be harsh, but the risks are borne principally by the entrepreneurs, stockholders, bankers, and employees directly and indirectly involved. The decline of strategic industries, however, may affect whole communities, nations, and even

groups of countries. Although the potential loss of entrusting a strategic industry to the market is not easily determined, the consequences may be great. There are of course risks to a government's supplementing market forces. But such risks are at least of its own making. Anticipating and reducing such risks is the responsibility of good government.

Third, economic growth is the progenitor of conflict. Simon Kuznets writes:

Economic growth perforce brings about a decline in the relative position of one group after another—of farmers, of small scale producers, of landowners—a change not easily accepted, and, in fact, as history teaches us, often revisited. The continuous disturbance of preexisting *relative* position of the several economic groups is pregnant with conflict—despite the rises in absolute income or product common to all groups. In some cases, these conflicts did break out into overt civil war, the Civil War in the United States being a conspicuous example. Other examples, in the early periods of industrialization among the currently developed countries, or, for that matter, more recently within some less developed countries, are not lacking.

Only if such conflicts are resolved without excessive costs, and certainly without a long term weakening of the political fabric of the society, is modern economic growth possible. The sovereign state, with authority based on loyalty and on a community of feeling—in short, the modern national state—plays a crucial role in peacefully resolving such growth-induced conflicts.¹

The United States faces three choices. First, it can persist in its existing inconsistent, often contradictory approach to industry. This approach is responsible for the difficulties high-technology industries face today.

Second, it can attempt comprehensive industrial planning. Proposals for a national industrial policy, national economic planning, a fourth arm of government, and a new industrial development bank are all examples. Comprehensive industrial planning has been attempted episodically in American history, even with vigor during the Great Depression and

World War II, but its record of success is mixed. Most Americans are deeply suspicious of it.

The last option is a new approach to public bargaining called "negotiated industrial investment strategies." It is the principal topic of this chapter.

Joseph Badaracco and David Yoffie of the Harvard Business School argue that any attempt to reorder existing political institutions will simply squander the time, energy, and talent of American industry and government.² They are right to insist that those who would tinker at existing institutions must demonstrate that their proposals for reform are better.

Why Past Attempts at Coherence Have Failed

To be effective a new approach must be fair, efficient, and stable.³ Fair in that it is consistent with a nation's notions of equity and justice; efficient in the sense that it represents the least costly allocation of resources; and stable in that government creates a workable precedent for the future, leaving the parties in a good relationship to deal with future change. Why has such an approach been so difficult to achieve?

Part of the explanation lies in America's historic ambivalence toward planning and the confusion in the profession itself. In the days of Frederick Law Olmstead, the preeminent landscape architect of the nineteenth century, planning was tied intimately to the preparation of a "comprehensive" or "master plan."⁴ Beginning in the 1950s a furious debate commenced within the planning profession over the concept of "comprehensiveness." By the mid-1960s the master plan was in disfavor. Planners were becoming increasingly aware that no matter how many planners were employed or how artfully planning agencies were fitted into the structure of government, the political system would continue to work incrementally through bargaining and compromise, not by "implementing the general interests," and that the main decisions in any master plan would need to reflect the distribution of power in the community at a particular time.

The challenges to comprehensive planning in the 1960s and 1970s can be grouped within several categories. The first was a frontal assault on the planners' competence. Since planners lacked an adequate theory of the city, some argued, they were "unable to say when a city is performing optimally and when it is not." Others challenged the pretensions of planners as self-appointed arbiters of the public interest. The analysis of physical, social, and economic conditions, they contended, involved normative judgments that planners were no more qualified to make than anyone else. The master planners were accused of being too narrow and ineffective. The critics urged that the most significant issues were concerns about the distribution of wealth, status and power, not issues of the physical environment that preoccupied the planners. Underlying these three objections was a fundamental distrust of planning. Ever since the Standard Enabling Act of 1928, legislators have seen the planners as interlopers and their pretensions to legitimacy as usurpations of the prerogatives of public authority.

The deepest attack came from David Braybrooke and Charles Lindblom, who suggested, in *A Strategy of Decision*, that comprehensive planning conflicted with the incremental, fragmented, and remedial character of most decisions. The attack on comprehensive planning led to a decade of exploration involving "advocacy" planners, utilitarian planners, and "learning-oriented" planners who focused their energies on small-scale experiments in urban development.

The failures of the city master planners have been paralleled by the abortive attempts at national industrial planning. Ellis Hawley writes of Hoover's utopian associative state and his disastrous program for bituminous coal (1921–1928):

Viewed from the altered perspective that took shape after 1929, his emerging private government seemed increasingly undemocratic, oppressive, and unresponsive. Associationalism, once widely accepted as a new and superior formulation of the "American way," became for many a mere facade behind which "selfish monopolists" had abused their power and plunged the nation into depression.

And the leaders of this new order, revealed now to be far less altruistic and far less prescient than Hoover had hoped they would be, seemed unable either to sustain expansion, solve festering social problems, or check the greatest economic contraction in the nation's history. As conflict mounted, moreover, demands for more effective "coordination" were soon transforming Hoover's efforts at associational direction and reform into programs and agencies he had never intended. Ironically, by demonstrating that they could not achieve the sustained expansion, rising living standards, and decentralized, non-coercive planning that they were supposed to achieve, he helped open the way for "big government" and state-enforced market controls in the 1930s.⁵

The historical landscape is littered with other failures: the War Industries Board of 1918, the Industrial Board of the Department of Commerce (1919), the National Recovery Administration, the Federal Trade Commission under Warren Harding, the Cotton–Textile Institutes, the Humphrey–Hawkins Bill, and the skein of plans in transportation, communications, agriculture, and defense. Of course, not all such efforts have aborted. The National Reconstruction Finance Corporation and the War Production Board during the crisis of World War II appear to have managed the requirements of war and materials with success. Ironically, America's greatest industrial planning achievements may have been the Marshall Plan in Europe and the occupation of Japan.

Why Comprehensive Industrial Planning Will Fail

Comprehensive industrial planning will fail in the United States primarily for four reasons. First, although George Lodge of the Harvard Business School tells us that we are in the midst of great transition from rights of property to those of community membership, from consumer desire to community need,⁶ America's animus against centralized planning is deeply entrenched. Existing examples of active national cooperation among government, industry, labor, and other interests are rare, often silent, in the nature of conspiracies.

We are still far from organizing all the parts into a whole.

Second, why suppose that government planners have a better feel of the market than those who deal directly with it? There is no reason to suppose that comprehensive planning will produce fairer results in the 1980s than in the past.

Third, comprehensive planning is unstable and easily assailed by disadvantaged interests. In the past in such cases the President has defended his policies by turning the plan into a public relations document.⁷ The Ford administration's comprehensive "plan" for conservation quickly degenerated into an apology for doing as little as possible, and President Carter's tripartite program for collaboration among government, business, and labor similarly went nowhere.

Finally, implementation of the plan would be uncertain. Government planners need not take responsibility for the consequences of their plans. Managers, however, bear principal responsibility. This asymmetry of interests destabilizes the process.

Our task, then, is to construct a fairer and more effective approach, one respectful of America's most basic traditions and institutions, and suited to the challenges of the decade.

Negotiated Industrial Investment Strategies (NIIS)

If strategic sectors can trigger economic growth, comprehensive industrial planning should not be needed. Identifying the strategic sector, promoting it effectively, and assuring that the benefits of growth are widely and fairly distributed to other industrial sectors and throughout the country is all that is required.

A mediated negotiation within industry and across industrial lines can serve as an effective means of attaining these objectives. The purpose would be to reach an agreement reflecting as closely as possible the declared interests of the participants. New institutional arrangements will demand competence, imagination, persistence, and resourcefulness. Painful, perhaps protracted at times, negotiation can offer

an effective, fair, and stable means of allocating resources to strategic and other sectors. The following discussion presents a general overview of the proposed process and illustrates each step by the example of the semiconductor industry.

Two points should be clarified. First, the term "negotiation" is a shorthand expression for a number of related ideas. To the average person, negotiation implies conflict. Although the negotiation of actual conflicts may be important, it will be only one aspect of the process described here. The economist or specialist on mediation views negotiation as a form of bargaining in which different interests, rather than true conflicts, predominate. The alliance of divergent interests toward the goal of maximizing joint gains is the primary function of the contemplated negotiation. There is a final class of concerted actions, which are essentially exploratory and creative, that is also included in the idea of a negotiation. Such actions are less concerned with interests, and more with discovery—discovery of the growth potential inherent in all strategic technologies and industries. This creative, exploratory function can motivate domestic and international negotiations alike.

Second, although the focus is on the federal government, the discussion is presented primarily as a model. State and even local governments and municipalities may wish to initiate their own negotiations over strategic industries, and as in other areas, these local experiments can refine and elaborate actions at the national level.

Although negotiating industrial investment strategies may appear alien at first glance, there are in fact numerous precedents and close analogies. One example is the investment strategy negotiated by the cities of Columbus, Gary, and St. Paul. In each case, three teams were assembled representing federal, state, and local interests. A different mediator oversaw each negotiation. In Columbus, the final product was a seventy-six-point agreement involving public and private investment totaling more than \$500 million.⁸

A different form of the negotiated investment strategy was used in Connecticut in 1983. Agreement was reached on the

distribution of \$33 million in federal aid to the state for human services. In fact, the amount represented a 25 percent budgetary cutback. Rather than making this decision arbitrarily, the governor decided to use negotiation. At the initiation of the governor's office, eighteen state agencies, 114 municipalities, and numerous private service agencies participated in a mediated negotiation. Three teams were assembled involving the state agencies, public and private providers of funds, and sundry local officials whose offices would have received these funds. With the aid of a mediator, the teams negotiated a set of commitments that were approved by the governor and later by the legislature.

A third model of negotiated rule making was first proposed in 1982 by the Administrative Conference of the United States. Under the conference's proposal a small group of interests, usually no more than fifteen, would work with a mediator to negotiate the terms of a specific regulation. Negotiated rule making differs from the present practice in that parties must now intervene in a formal administrative hearing to register their opposition to a proposed rule drafted by an agency. The Environmental Protection Agency, the Federal Aeronautics Administration, and the Occupational Safety and Health Administration have all experimented with the conference's new procedures.

Negotiated rule making, however, is simpler than the negotiated investment strategies proposed here. Rule making is a well-known administrative procedure involving established practices and a specific agency with limited power. The object of a rule-making negotiation is clear, and the parties are under special pressure, since if the negotiation fails the agency will promulgate a rule by itself. In contrast, negotiated investment strategies involve multiple interests and objectives. Negotiated rule making overlays only a small part of a negotiated industrial investment strategy.

Beyond negotiated rule making, there are a variety of somewhat less precise analogies. Probably the closest is the numerous standards developed by consensus. Consensus standards are developed though a structured decision-mak-

ing process among representatives of interests who are substantially affected by the standard. During the negotiation the parties frequently confront difficult value choices involving trade-offs between cost and safety. Virtually every person in the United States daily entrusts his or her life to such negotiated rules, in the form of electrical and building codes, product safety standards, and workplace and health standards. The existence of these standards is evidence that complex public choices can be negotiated.

The environmental field also offers many examples of mediated negotiation among federal, state, and local industry, both public and private. The National Coal Project in which dozens of parties reached agreement on over 200 recommendations concerning the use of coal in the United States is also an important illustration. The various negotiations conducted by independent mediation centers such as the Institute for Environmental Mediation in Seattle, the New England Center for Environmental Mediation in Boston, and ACCORD, Inc., in Denver are other examples.

The Ten Basic Steps Toward the Marriage of Warring Interests

Although these steps in negotiating an industrial investment strategy are for a strategic sector or sectors—in this case the semiconductor industry in particular—the basic paradigm can be used with at least equal effect to supplement government policy toward any industry, strategic, stagnant, or declining.⁹

1. The Office of Strategic Industries (OSI) announces that it will accept nominations for strategic industries.¹⁰ The criteria based on the method described in Part I are published in the *Federal Register*, the leading newspapers, and other media of wide circulation.¹¹ The nominations are reviewed by an Advisory Council to the OSI. The OSI with the approval of the President designates a strategic industry or a group of strategic industries.

2. The OSI next tenders an offer to negotiate to the industry. The offer is published in the *Federal Register* and other public media.
3. The first meeting is convened. The interests and positions of the parties are clarified and a chief mediator, with a team of assistant mediators, is selected.
4. The negotiation begins. The range of affected interests is expanded.
5. The negotiators prepare a "single negotiating text." The text is circulated and amended.
6. A tentative agreement is reached and the draft agreement published in the *Federal Register*.
7. The negotiation resumes. Additional comments are obtained and the negotiators obtain final commitments from their committees, companies, and associations.
8. The agreement is ratified.
9. The agreement is implemented by the responsible agencies and contracting parties.
10. The agreement is monitored and periodically renegotiated.

The OSI would be a new office in the White House, along the lines of the United States Trade Representative (USTR). The OSI could even begin as an independent group in the White House, although in any case a strong presidential mandate would probably be essential for it to be effective. The OSI would be principally responsible for evaluating strategic industries and overseeing and facilitating the negotiations. Its head would be a member of the Cabinet. It would be independent from any industry, agency, or other interest having a stake in the outcome of the negotiation.

If the OSI is to play an innovative role, innovators and entrepreneurs must be its mainstay. The staff must be recruited from industry and other walks of life under a special program, perhaps like the White House Fellows program, that rewarded imagination and creativity in government.

The OSI would have an advisory council,¹² consisting primarily of inventors and, in moderation, scientists, economists, legal scholars, and others with pertinent knowledge. Its members would be appointed by the President and Congress. The Council would screen nominations and generally help to strengthen the functions of the OSI.

The method of identifying and evaluating strategic industries would be primarily a technical process, closely linked to the politics of the negotiations themselves.

Nominations could be presented to the OSI by virtually anybody—an industry association, the National Academy of Sciences, various federal or state agencies, private research institutions, business associations, and other groups and interests. Once presented, however, the nominations would have to satisfy clear and specific criteria for a strategic industry. The criteria would be based on the analysis introduced in Chapter 8.

Only six of the ten steps of the Trigger Method have been discussed at any length. It is now time to link that discussion with the process under consideration. The criteria will include all the key indicators in the method, and perhaps others to be added from time to time. For example, one criterion might require the nominator, if an industry group, to suggest one or several other linked industries whose designation as strategic would most benefit it. This would encourage firms in one industry to explore linkages and to discover mutual gains with other industries. As will be seen, this will be essential to the success of a bargaining strategy.

Once the nominations are collected, the OSI will face the onerous task of evaluation. The first step is to arrange all the nominated industries along the horizontal axis of a matrix with the key variables on the vertical axis as indicated in Table 6.

The staff of the OSI would then summarize the findings for each nominated industry.

The OSI's next task is to assess all nominated industries with respect to an absolute standard of strategic leverage. A simple ranking of "high," "medium," and "low" can be used.

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TABLE 6

SELECTING STRATEGIC INDUSTRIES KEY VARIABLES DEFINING THE INDUSTRY	INDUSTRY			
	A	B	C	... n
Assessment of Economic Indicators				
Growth				
Exports				
Employment				
Productivity				
Research				
High Level of Investment in Human Capital				
High Rates of Invention and Innovation				
Economies of Scale				
Economies of Specialization				
Economies of Scope				
Learning Curve and Product Life Cycle				
Vertical Integration				
Technical Indicators				
Dual Use				
Core Technology				
Frontiers of Science and Technology				
Knowledge Intensive				
Technological Convergence				
Complementarities				
Synergisms				
Complexity and Differentiation				

The Pillars of National Industrial Recovery

TABLE 6 (continued)

KEY VARIABLES	INDUSTRY			
	A	B	C	... n
Social & Political Indicators				
Generalizable Pattern of Production				
Generalizable Pattern of Commerce				
Relation to Other National Policy Objectives				
National Perceptions of Wealth, Prestige & Power				
Scale Ratios of Society				
Secondary & Tertiary Effects				
High Multiplier				
Deep "Penetration" of Input-Output Matrix				
Forward & Backward Linkages				
Rate of Feedback				
High "External" Benefits; High "External" Costs				
Final Ranking				

The analysis would be performed by the staff of the OSI. By this procedure the field of nominated industries could be narrowed to only those demonstrating the most significant strategic potential.¹³

Next comes the comparison of the industries within the "high" category with respect to their degree of strategic leverage. This presents the problem of aggregating nominal and ordinal variables across the matrix. This difficulty is faced

by many researchers involved in cost-benefit analyses, environmental impact reviews, and other areas of planning. Although the simplest way to proceed is to assign an equal weight to each variable, there are more sophisticated techniques for handling such problems.¹⁴ The industry whose overall ranking is highest is the most strategic. This method provides the OSI with an initial indication of areas of greatest leverage.

The final task is for the OSI, with the concurrence of the Advisory Council (AC), to begin contracting the industry's representatives or nominators. Contacts are made in the order of ranking. Simply because an industry is ranked "most strategic" would not necessarily mean that it is the best candidate for a negotiation. It is possible that after consultation, the industry's leaders or the OSI or both will conclude that a negotiation is not appropriate. Such insights would prove very useful in other negotiations or at some future negotiation involving the same industry.

As discussed, it would be highly disruptive to permit judicial review of the OSI's determination of strategic potential at so early a stage in the process. Those dissatisfied with a decision of the OSI can appeal to the AC, which would be empowered by statute to make final determinations in those cases.

After evaluating the strategic industries and completing its informal contacts, the facilitator is now ready to tender an offer to negotiate.

Steps 3 and 4 deal with convening the negotiators and with the complexities of representation. The first task is to determine the appropriate range of interests and who will represent these interests.

In general, any interest that might be substantially or materially affected should be represented. At the outset it will be necessary to distinguish those interests which are indispensable, without which the negotiation could not profitably proceed. The participation of others, who are more remotely affected, can be limited to written comments.

Over the life of any negotiation issues may change and

interests will naturally expand and contract. When an issue is resolved, an interest group may wish to remove itself from the negotiation and when a new issue arises, new interests will likely wish to participate.

Once the appropriate interests are identified, the next issue is who will actually represent these interests. Some firms may wish to appear individually. Others, especially where their interests are closely aligned, might elect to appear through an industry association. Diverse, less easily aggregated interests, such as consumer or environmental groups, would be represented by a government agency mandated to act as a surrogate for these interests or by representative organizations of private citizens.

Any representative must enjoy the trust of his or her constituents. In industry the chief operating officer might be appropriate since he or she knows the policies of the company and can predict its reactions. The chief officer is also in direct communication with pertinent interests in the company whom he or she can draw into the negotiation at appropriate times.

Some interests, such as environmental, consumer, or other "public interest" groups, may not be able to afford to participate by their own means. This presents a problem because the political legitimacy of a negotiated agreement rests largely on the concurrence of the significant affected interests.

The OSI would defray these expenses. If an organization's participation is deemed essential to a negotiation, defraying its out-of-pocket expenses actually conserves government resources. Moreover, since collateral interests can be a valuable source of new ideas and information, including these interests produces a more responsive and stable agreement. Although in practice the additional cost of subsidizing such interests has often been minimal, their participation should be underwritten even if the costs are substantial.¹⁵

In some cases an interest group essential to the negotiation may refuse to participate, hoping to block the conclusions of a negotiation at a later date. In such a case the facilitator can try to convince the group that through participation it would be in a better position to influence the outcome. In addition,

the facilitator must first decide whether other organizations whose interests are fairly close to those of the recalcitrant are willing to participate. The facilitator must also determine whether the absent group's interests are significantly or only tangentially affected. Finally, the facilitator must consider whether the group is so important that its failure to participate would undermine the legitimacy of the agreement. Alternatively, the facilitator could decide that the party ultimately would join the discussions and participate in good faith. If the facilitator ascertains that the appropriate interests are willing to participate, he must next ask each party to pledge to negotiate in good faith in an attempt to reach a consensus. Even an abstract commitment can be useful when in the course of a negotiation emotions become frayed. A commitment to mutual gains can convert many conflictive situations into "positive-sum" outcomes.

The next task is to define the initial issues.¹⁶ This is often the most difficult task in a negotiation. As in negotiated rule-making, the facilitator can help to define the issues by asking the parties to define what they deem most important. At this preliminary stage the issues are often framed in general terms to help the parties grasp the overall scope of the negotiation.

After initial parties are assembled and an agenda is defined, the appointment of a team of mediators is the next task. As in other areas, the mediators need to possess neutrality, analytic capabilities, and a commitment to the process. The chief mediator would likely be an independent outsider, appointed by the president and supported by a team drawn from the OSI. Ideally he or she would be familiar with the industry and its problems and respected by the parties. As in other situations, the mediator would meet with the parties and would discuss their objectives and concerns. The mediator would help the parties parse their true concerns from their opening negotiating positions, and define clear criteria to measure a successful agreement. The mediator could focus discussions in such private meetings and point out extreme positions, offering creative solutions along the way.

A mediator's role often changes subtly in the course of a

negotiation. In the early stages, the mediator shuttles back and forth meeting with the parties, investigating issues, and reporting back to the conference. Later the mediator explores issues in greater depth, helps to draft an agreement, and proposes amendments. After ratification, the mediator oversees what Howard Raiffa calls, "post settlement settlements."¹⁷

There are various views on the proper role of a mediator. Some trained in labor relations believe that mediators should remain passive: any effort by the mediator to influence the style or content of the negotiations sacrifices neutrality. Others disagree and feel the mediator should be proactive as well as reactive. In general, the more experienced the parties, the less the mediator needs to interfere. The less experienced the parties, the more initiatives a mediator should take. The clearer the rules and the more institutionalized the negotiation, the less burden on the mediator. In the early days of negotiated industrial investment bargaining, a more proactive mediator will be needed.

With the appointment of a mediator, the next step will be to publish notice in the *Federal Register*, as well as in the major newspapers, trade journals, and other media of wide circulation. The notice should be written in plain English, and include the following: a description of the strategic industry(ies), a short summary of why it was designated and specifically how it satisfied the criteria; the names of the participating groups and their representatives; descriptions of the interests represented and the initial positions presented; the participating government agencies; the name of the proposed mediator; the issues the conference proposes to consider; and a proposed schedule for completing the work of the conference. The notice would invite members of the public to comment on whether a negotiation for the designated strategic industry is appropriate, whether all appropriate interests are represented, whether the members selected adequately represent their interests, whether the conference is considering the appropriate issues, whether agency representatives are appropriate, and other matters of

interest. Comments would be due thirty to sixty days after publication of the notice. This procedure ensures that no group with a substantial interest is excluded.

The facilitator and the mediator next consider all relevant materials submitted in response to the *Federal Register* and other notices. No doubt at times someone will assert that he or she has been overlooked. This will require a determination of whether the new interest is sufficiently close to the issues under consideration that it has "standing." At times an interest group may be simply too remote to be included. In some cases even remote interests would be included and the determination guided by whether their petition was frivolous. Only those seriously interested in the outcome will normally seek to participate.

The second question is whether the proposed interest is different from the interests already represented. If it is virtually identical, there will be no need to include it. Sometimes parties will attempt to construct differences in order to secure a representative at a negotiating table. The facilitator and the mediator must determine whether the applicant's interests are really divergent from those proposed in the notice, and whether its interests are already adequately represented.

Third, even if an interest is already represented, in some cases duplication is desirable. In deciding whether to add a representative, the facilitator and the mediator must consider the number of representatives already present, the diversity of their views, and the importance of the new party to the negotiation.

In somewhat analogous situations, a mediator can seek the advice of the preliminary negotiators. The group as a whole is often in the best position to evaluate whether a sufficient nexus exists between the applicant and the subject matter. The final determination, however, is made by the facilitator and the mediator.

The sensitivity and importance of these opening moves should not be underestimated. In order to assure that the parties see the process as legitimate, each organization with a significant interest must be permitted to participate and no

interest can be turned away unless its connection to the negotiation is remote. On the other hand, if every interested person, firm, or organization participated the process would soon become unwieldy.

One way of consolidating interests is for the facilitator to organize them into groups. The groups can then develop common positions and identify common representatives.

At this stage the negotiation is in danger of degenerating into a squabble over who gets to sit at the table. The facilitator and mediator must ensure that the process of assessing interests and assembling coalitions is of the highest integrity.

Judicial review is another issue. At this stage it would be most unwise. Permitting disgruntled parties to challenge a negotiation in court even before it begins will subject the entire process to delay and doubt and interfere disastrously with the fragile formation of trust. Judicial review needs to be deferred until the promulgation of a final agreement. This should not unfairly prejudice disappointed interests: they could still submit their views before such an agreement became final. They would still have ample opportunity to urge that it be renegotiated if they felt it was unfairly decided, and to upset it in the courts.

Illustration 1

Suppose the Semiconductor Industry Association, the Commerce Department, the National Academy of Sciences, or some other body nominates the semiconductor industry as a strategic industry. The OSI reviews this nomination along with other candidates and reaches the conclusion that the industry satisfies a sufficient number of the key characteristics to justify its being the subject of an NIIS. What would be some of the objectives and problems of this negotiation?

The basic threshold question for the captains of the industry is, would a negotiation be helpful, given the industry's structure, personalities, and technical needs? At this point in its development, semiconductor technology is turning over so rapidly and the applications of new innovations are so varied that no single firm can capture and control more than a few segments of the market for one generation. Success in this industry, perhaps more than many others, is determined

not simply by inventiveness, but also by production skills and marketing finesse. There is a built-in incentive for firms to confederate.

For example, such alliances are important to a medium-sized, innovative semiconductor company with a relatively modest production capability and no marketing skills. Unaided, such a firm will not succeed; the competition is simply too ferocious. In order to secure contracts for its designs, or to identify its most profitable market niche, it must find partners. This will be a difficult decision for some corporate executives who want to do everything in house. Those with vision, however, will explore options.

A firm with strong production technology and marketing capabilities, but with a sluggish R&D division, may also perceive it in its interest to ally itself with the first firm. By doing so, it can benefit from the former's innovative design capabilities rather than itself pointlessly seeking to become the industry's leading inventor. Both firms have a natural incentive to find a cooperative solution, at times in cooperation with third parties, to capitalize on their collective capabilities.

But why should the semiconductor industry begin an NIIS when it may already enjoy ample representation through other channels? Why should a senior operating officer at Intel Corporation bother with an NIIS when the Semiconductor Industry Association (SIA) may be addressing Intel's problems over Japanese customs duties, the American Electronics Association (AEA) is already dealing with immigration issues, and the National Association of Manufacturers (NAM) is lobbying for R&D tax credits?

The answer may be that the NIIS can help Intel achieve its objectives more effectively and inexpensively than the existing fragmented structure. Within the NAM, Intel's interests must compete with a host of other diverse interests, some of which may not be familiar with or supportive of Intel's needs. The SIA, on the other hand, has proved itself most successful in dealing with relatively low-level and narrow issues. Intel and other corporations must pay excessive fees to lawyers and lobbyists who feed upon the food chain of special interests. By rationalizing the process by which Intel seeks the goals it cannot accomplish by itself, an NIIS may save time and money and increase the likelihood of success. Moreover, the NIIS would probably increase the visibility, membership, and political clout of the SIA, AEA, and other representative organizations.

The first procedural problem for the OSI will be the definition of the industry. The semiconductor industry today is particularly com-

plex, consisting of: (1) small integrated-circuit (IC) "merchant" producers, such as Siliconix and Monolithic Memories; (2) large IC merchants such as Texas Instruments, Motorola, Intel, and National Semiconductor; (3) electronic systems manufacturers such as Hewlett-Packard; and (4) vertically integrated systems manufacturers such as IBM and AT&T. The structure of the industry is further complicated by its international character. Most of the major firms have cross-licensing arrangements with Japanese and/or European partners and in recent years there has been substantial foreign investment in U.S. companies.

The industry is also rapidly changing. The major merchant firms are consolidating integrated-circuit technology and emerging as a new generation of diversified electronics "systems" manufacturers. At the same time the smaller merchant firms are establishing themselves within niches of the rapidly segmenting markets for integrated-circuit components. "Captive" production—by acquisition or in-house start-ups—is also occurring as final electronic systems producers recognize the importance of integrated circuits to the development of future products and market growth.

The draftees of the initial offer need to consider whether they wish to restrict its terms to a part of the industry or to broaden it to apply to all these segments. Different segments of the industry today face different problems. Since the integrated-circuit industry is becoming more capital-intensive, finance will increasingly constrain the expansion of IC companies, particularly medium-sized firms. Medium-sized firms are generally unable to borrow heavily in a cyclical industry where debt represents a fixed cost, or to use profits from unrelated businesses, as larger integrated firms do. Start-ups sometimes find venture capital more easily.

A difficult issue will be whether foreign semiconductor firms are invited to participate. Many will question why Hitachi, Japan, should be invited to exert as much influence on U.S. domestic policy as Intel, U.S.A. On the other hand, under existing law it would be hard to ban Hitachi's American subsidiaries. The best solution is to deal with foreign firms through a separate negotiation as described in Chapter 11.

The plenary session's first task is to agree on the ground rules to govern the negotiations. A critical problem is privacy. There are strong reasons for assuring the privacy of the negotiation. First, a party may be reluctant to yield confidential data that can be useful to negotiations if doing so will

destroy its confidentiality. The protection of trade secrets and other privileged information is an incessant concern for the semiconductor industry. Senior industry executives will hardly be willing to discuss their basic needs with their competitors if this means betraying corporate weaknesses or strategies. Some disclosure of course is a price in any concerted action, and the NIIS will not require any greater disclosure than already exists within the industry's trade association. Since the Semiconductor Industry Association has become increasingly active, many firms might elect simply to have the association represent them. The industry's firms—IBM, AT&T, and Texas Instruments—would likely wish to appear individually.

The parties may also be reluctant to bargain if they believe their tentative proposals might later be used against them in litigation, and some will be unwilling to bargain flexibly in an open setting. For these reasons, the negotiators should be permitted to close their meetings in appropriate circumstances. One way of striking a balance between the needs for confidentiality and disclosure is to require a majority vote with a clear statement of reasons before permitting the group to enter executive session. Without a convincing case, the negotiations would remain public. Since the draft agreement will be published, members of the public will in any event have an additional opportunity to check a decision that might be deemed adverse to their interests.

If the conference decides to go into executive session, a variety of additional problems need to be resolved. One is an agreement on how the group will make public statements. A basic requirement that no one may publicly characterize a position taken by another can prevent pressure from being applied on parties through press releases. Or, the committee could agree that no public statement will be made without review by all the parties.

A procedure must also be established whereby the parties' positions and the information exchange will not be held against them if negotiations are unsuccessful. This procedure is similar to the traditional rule of evidence that prohibits the subsequent use of offers for settlement.

Every negotiation is governed by several fundamental principles. The first principle is to focus on the interests of the parties, not on their positions. Philip Harter notes:

Parties develop initial positions for several reasons. They might be a package compiled by the representatives from the "wish" lists of the constituents. They might enhance the ultimate bargaining position. They might reflect the party's belief that the initial position is the only solution to the problem. Communications can quickly break down if the parties' initial positions are the focus of discussions because each side will dig in to defend its starting point, and antagonism will result.

The parties themselves do not always recognize what their interests are. They need to define what they really want, to sort out their priorities, and to define the criteria by which they will judge an ultimate agreement. Because the party may enter the negotiation with a particular position that does not reflect an interest analysis, the mediator or the parties themselves should probe to discover just what the respective interests are.

The second principle is to seek options that allow mutual gain. People enter into negotiations because they believe they can better achieve their goals through negotiation than through some other process. Agreement is more likely to occur if it can be cast in terms that permit each party to win since the negotiators can then view themselves as a collaborative group seeking a solution to a problem, rather than as combatants. To be sure, this goal is frequently elusive when the parties have conflicting interests that must be reconciled. The goal of attaining collaboration, however, can be borne in mind by the parties as they try to invent solutions that allow each side to win its important priorities. The parties must compare what is practically achievable in negotiations with what is likely to occur should negotiations break down.

The third principle is to define objective criteria. By agreeing during the negotiation to the objective criteria by which an ultimate agreement might be judged, the parties can facilitate negotiation. Once parties establish objective criteria,

they can explore alternative ways of meeting their respective goals and measuring the proposed solutions against them.¹⁸

The art of negotiation offers various techniques to help the parties reach agreement. One is for the parties to develop a common data base by deciding to conduct research jointly. The parties preserve their option to disagree on the implications of such research. Each party can also review and comment on technical data possessed by another. This has often helped agreement on common principles. At times the parties will simply not be able to reach agreement on the interpretation of some data. The mediator can then help the parties reach a common interpretation.

It is likely that the circle of those involved will expand as a bargaining proceeds. For example, if the bargain contemplates legislation, it will be necessary to involve the key Congressional committees and their staffers; if local concerns are raised, state or local governments will become involved. If trade relief or other questions of foreign policy are deemed important, the State, Commerce, and Defense Departments, the Trade Representatives Office, and other government agencies will become involved.

Roger Fisher has proposed a sensible format applicable to most negotiations.¹⁹ The first task is to focus on a manageable portion of work and to invent creative solutions. Next, the parties set objective standards to judge these options, and by their discussions, select the most promising alternatives.

A practical means of facilitating agreement is the use of a single negotiating text. By brainstorming with reference to a single document the parties can identify the critical issues involved and focus on potential solutions. By circulating the text for comment and revision, the range of consensus is thereby narrowed. No one is committed to these solutions. Rather, the goal is to define the contours of a possible agreement. No one is permitted to make adverse comments or criticisms. The function of the brainstorming is to develop as many ideas as possible. A mediator assists in developing a list and then the parties then begin weeding out the inappropriate issues and raising new ones.

Throughout the negotiation the elements of a strategic industry play a central role. As noted, the criteria define a strategic industry at the outset and thereby indirectly determine the critical interest groups. Since the elements of a strategic industry are "pressure points" for government action, they also have an important role in shaping and focusing the subsequent discussion. Moreover, they also help define new interests that ought to be involved. Although a given interest might not in itself be strategic, it could represent an important secondary beneficiary of government assistance to a strategic sector, or provide a strong domestic demand for a strategic industry's products. The revitalization of old industries by entrepreneurs with bold technological strategies is occurring in the United States today in autos, agriculture, consumer electronics, and other fields without government incentive. The negotiation could help accelerate this positive trend.

Although an intense engagement of interests will likely be crucial to the implementation of a stable and responsive agreement, the fray can also become overheated. At such times there is need for a cooler, longer-term, more analytic perspective and, perhaps most important, a perspective that does not demand any commitment from the parties. For this reason, the OSI with the aid of the staff of its advisory council can prepare a visionary agreement based on a deep probing and mapping of the interests of the parties. This detached, nonconfrontational counter draft would be circulated for comment and might prove particularly helpful in breaking logjams and in identifying solutions that the parties themselves might not easily discover.²⁰

As the negotiations progress, the parties will begin to near consensus. There is no a priori definition of this term; thus parties must assure that it is properly defined and understood at the outset.

The most acceptable definition of consensus is a "general agreement." This means that no party dissents significantly from the shared position. General agreement does not necessarily mean unanimity, because even if someone disagrees,

the dissent may not be significant enough, either in weight or number, to destroy the agreement. For example, a party may dissent on grounds that are generally viewed as irrational, or a party's interests may not be sufficiently affected to regard its dissent as significant. In group consensus dissenting interests that are not directly or immediately affected can be disregarded even on major issues without destroying the consensus. The dissent of a major interest, however, destroys a consensus even on a minor point. Positions are weighed, not counted. When deciding whether consensus has been reached, the nature of any dissent is considered, including the strength of the dissenter's views, the basis for the dissent, and the relationship of the dissenter to the issues.

How do the parties increase the likelihood of reaching consensus, and who decides when a consensus has been reached? There are several practical ways of proceeding. One is unanimity. Requiring unanimity ensures that no interest can be outvoted. Thus, when an agreement is reached, all interests have assented to it. Unanimity obviates the need for extensive fact-finding to legitimate a negotiation. Since unanimity grants a veto to every party, it transfers power to less powerful interests. This, however, is its chief defect. Often each party begins to worry that others will not agree and so attempts to preserve its ability to control the outcome.

Since in most cases unanimity will be regarded as impractical, concurrent majorities can serve as a simpler and more effective approach. If all interests concur, it may be unnecessary to obtain the agreement of each individual representative. Often in such situations members of various negotiating groups are identified by interest and caucuses are formed. Each caucus then supports the decision. It is not necessary that every member specifically agree. This procedure mitigates the potentially disruptive influence of an ideology.

The final draft agreement would be published in the *Federal Register* and other relevant media. The notices would include the composition of the group; the nature of the consensus reached; the issues raised during the discussion; a

short narrative about each section of the agreement; and data and other information considered by the group. As in other areas the purposes of publication are primarily to assure the broadest public support for the agreement and to permit dissenters an opportunity to register their opposition.

The notice will probably attract new interests and raise new issues that will compel the negotiators to return to the table. This is not a waste of time. With each cycle of bargaining the issues will likely become more clearly defined, the dissent less acute, and consensus more easily attained.

Closure in virtually all negotiations is a central issue. If left too open-ended, some of the participants might not take the proceedings seriously, while others with vested interests in the status quo might hold out, hoping to frustrate agreement.

Two techniques can be used to strike a balance between the need for resolution and the countervailing desirability of according all appropriate interests a fair hearing. First, a time limit will be needed. This issue can be negotiated by the parties at the outset or discussed throughout. If an agreement was not realized within the limit, the negotiations would either be abandoned or postponed.

Second, the facilitator needs some mechanism of helping to break a deadlock of interests, particularly when one group appears to be holding out until the time is exceeded. In such cases the facilitator might be given a limited authority to draft a solution to the deadlock that would bind the parties unless they countered with a better, more mutually agreeable proposal.²¹ Such authority would have to be used subtly and sparingly so as not to replace a party's recalcitrance with governmental arbitrariness.

Illustration 2

How should the facilitator and the staff of the OSI mediate the attainment of joint gains in the semiconductor industry? Because of the multiplicity of interests and the ferocious competition in this industry, it might be unwise to urge face-to-face bargaining at the outset. A less threatening approach would be for the OSI to prepare a creative set of options and to circulate a draft to the initial participants for their

comments. Although no company would obligate itself to any position by suggesting ways of improving the draft, its suggestions would help to get the process going.

Here are some of the proposed win-win solutions contained in the draft.

The protection of microcode is an issue of sufficient clarity and current importance to the semiconductor industry to command the parties' attention. Microcode is the operating program that runs a logic device. Although microcode in theory can be protected by a patent or copyright, in practice under existing law virtually anyone can escape liability simply by tweaking the system and running a slightly different program. As a result, firms that have expended substantial funds in perfecting and marketing the device are denied a substantial part of the fruits of their invention.

The facilitator will first map the respective interests involved. A leading firm like Intel has a strong interest in expanding current copyright and patent protection for its state-of-the-art device. It also has a subordinate interest in permitting a few firms to produce and sell the device under license. This enhances the market's acceptance of the device. Intel's smaller competitors, however, have an opposite interest. They will seek to limit Intel's copyright and patent protection in order to give them freest rein to experiment and innovate. Both Intel and its smaller competitors have a joint interest in reducing the existing uncertainty in the industry from the patchwork of contractual arrangements and unclear legal standards.

This coordinate interest gives the facilitator his target. His basic task is to devise a legal standard sufficiently clear that it protects Intel's innovation while still encouraging its competitors to innovate. In finding this middle point, the facilitator will need to explain the issue with the Patent and Trademark Office and staffers of relevant congressional committees, clarify their positions for the semiconductor firms, and help both sides formulate a strategy for implementation. The principal issue in these discussions is how to raise the value of license agreements. This might require stiffening the copyright or patent laws so that no one could reverse engineer, manufacture, or sell a device without a license. This could raise the value of second-source agreements and encourage their wider use across the industry. By encouraging broader use of such contracts, the OSI would help reward innovation, discourage theft, stimulate technological diffusion, and help reduce uncertainty.

What is the character of some of the other bargains that could be

brokered by this process? In some cases the facilitator simply helps accelerate the rate of linkages, such as those between vendors and users of automated chip-design systems. In other cases, he or she encourages joint research on projects that might otherwise be abandoned. A leading semiconductor maker might reject a proposed project because the rate of return is too low, for example, 12 percent. A firm in a less vibrant industry, such as steel, however, might find a 12 percent annual return very attractive indeed. The facilitator would point out the potential gains to both.

In some cases the facilitator might even get the leading firms to consider collaborating with the industry's less successful companies. This constitutes the greatest challenge for the facilitator and staff because such alliances appear against the interests of the dominant firms. The joint development of "clean room" technology, however, would seem one case where although all parties will benefit by a concerted effort, the competitive position of the leaders would in no way be jeopardized. Clean room technology involves sanitizing the basic environment of semiconductor production. It is a crucial requirement for virtually all advanced work. Although the development of this technology will benefit the less competitive firms, the leaders would probably be able to exploit such advances more fully. The development of this technology will be a net gain to all.

The facilitator's role is not always so easy. We must not underestimate the fierce conflicts that a semiconductor industry negotiation can provoke. Although the semiconductor industry has not experienced the conflicts with labor that have beset other industries, such as automobiles, automation in the semiconductor industry will force automation in user industries that are already minimized. These unions might wish to intervene in the semiconductor industry negotiation.

Equipment vendors might also perceive a threat. As the semiconductor industry becomes increasingly dominated by larger firms, or by consortia of smaller firms linked by second-source agreements, over time the demand for equipment might be reduced. This would compel a shakeout in the vendor market that might be vigorously opposed by the weaker vendors.

Although not widely publicized, the manufacture of semiconductors requires the use of various toxic substances. Environmental interests might therefore insist on intervening in the discussions.

The advent of these interests will raise acute problems of legitimacy and administrative feasibility. From the perspective of the semiconductor makers, the petition by the environmentalists or the unions to

intervene would seem like an irrelevant intrusion. The facilitator is immediately placed in the difficult position of balancing the virtues of opening the process to all legitimate interests against the desirability of preventing a breakdown in the discussions. The semiconductor firms, on the other hand, have to weigh whether the potential gains of continuing to negotiate are worth having to deal with issues that they feel could be more effectively checked by the existing political and legal process.

In riding herd over these discrepant interests, the facilitator and the core group do not have to deal with the unions, vendors, or environmentalists within a single discussion. Each issue can be segregated on a separate agenda with only those interests most concerned with that issue participating. The environmentalists might have no direct concern about the vendor's situation, and the vendors might see the unions' problem as a separable concern. The participating semiconductor firms might conclude that confronting all these interests head on in separate bargaining sessions would weaken these interests' political and legal clout outside of the bargaining room. By parsing out the interests, and by helping to keep the discussions focused on a narrow set of concerns, the facilitator is more able to move the parties gradually toward a tentative understanding.

The final agreement would have a hybrid status in law. Although the courts might decide otherwise, it would seem to be in part treaty, collective bargaining agreement, rule making, and private contract. It is like a treaty in its multi-lateral form and its principal reliance on government action for its implementation. It is like a collective bargaining agreement in that it is a mediated settlement in accordance with arranged rules. It resembles a rate-setting procedure in public utilities because parties are permitted to negotiate schedules under government supervision. It is like a private contract in that it is an agreement on specific terms and conditions.

The agreement might also include a number of private pacts and understandings contingent on future acts or circumstances for their performance. Like a contract or treaty, the agreement could contain specific provisions that address changes in circumstances, such as merger, bankruptcy, or an acquisition. The agreement could also contain severability

provisions so that its provisions could be applied independently.

Periodically the agreement would come up for review and it would have an expiration date. Where there was a change in administrations, the rights defined under the agreement would continue as in any other public contract, although they might be superseded by legislation. In cases of impairment of existing contracts, compensation would be required.

The flexible character of the agreement suggests how it might be enforced. For example, the agreement could grant the private signatories rights to enforce the government's contractual obligation of procurement. Some provisions, of course, could not be legally enforceable. No committee of the Congress can legally contract to enact legislation, any more than the State Department can contract to produce specific results in a negotiation with a foreign government. The best the government, or indeed any other participant can do, is pledge its "best efforts." In such cases the agreement would contain a skein of contingent promises. If X committee introduces A legislation and it passes, Y will perform B act, and Z will implement the program in this way. And so on.

To remind the parties of its binding character, the agreement would impose specific penalties for breach. And even if penalties proved too costly to enforce, a company's failure to comply would tarnish its reputation and create a precedent for its exclusion from future negotiations. Private enforcement of public obligations might also play a part. By its terms the agreement could subrogate the government's claim to specific aggrieved private parties.

The agreement would provide a framework for the specific tax, trade, and other incentives based upon it. Beyond this it would represent an important precedent that could shape the course of subsequent debate in a strategic industry and in future negotiations in other industries. It could also shape expectations and actions in the financial community and the securities markets that would compound its influence far beyond its original terms.

Illustration 3

What would be the character of a negotiated agreement in the semiconductor industry? In general format it might resemble that concluded on May 21, 1980, by federal, state, and local negotiators concerned with the overall development of Columbus, Ohio.²² That agreement included a basic preamble stating the intent of the parties; an agenda of topics; the basic points of the agreement, covering transportation, human services, fair housing, historic preservation, displacement, leveraging private investment and intercity business development, unemployment, pollution control, and the management of urban sprawl; a detailed procedure for implementing and monitoring the terms of the agreement; and, finally, a list of the signatories.

The signatories to the semiconductor compact might include the representatives of major federal agencies, the pertinent Congressional committees, the chief executive officers, the vendors, unions, or firms in other industries, and various other special interests. One set of provisions in the agreement would involve the government's commitments. These would cover increased R&D tax credits; special grants to assess the industry's manpower needs; a detailed plan to negotiate the reduction of foreign customs duties; federal funding for the industry's think tank, the Semiconductor Research Corporation; more effective legal protection for industrial property rights; and assessment of the impacts of semiconductor production on employment and the environment.

The agreement might also address specific problem areas, for instance the Defense Department's Very High Scale Integrated Circuit (VHSIC) project. To date the project has had three purposes: to advance the date of common commercial use of VLSI; to increase the speed at which advanced circuit technologies are applied to military systems; and to assure the development of circuit speed and built-in verification. One of the industry's principal concerns about VHSIC has been its diversion of scarce resources away from the commercial sector. The agreement might contain new guidelines issued by the Defense Department, based on the negotiations, that reflected a more sensible balance between industrial and commercial needs.

Another issue might be wasteful reduplication of efforts. At present there are various special state and federal programs to promote research and development in the semiconductor industry. California, for example, has established the "Microproject" to support local firms and to attract out-of-state companies. A board of overseers screens

research programs proposed by industry and university researchers. State funds are provided to match industry commitments up to a total of \$1 million. Other states are following California's example. The final agreement might contain commitments or understandings among some states or communities to rationalize the use of funds in order to avoid waste.

The agreement might also serve as an umbrella for a variety of private pacts, commitments, and understandings covering the gambit of second source, joint research, acquisitions, and other collaborative arrangements already discussed. They might also involve compensatory schemes to special interests that had established they could be injured by the industry's activities.

The final agreement would reflect for the first time a coherent statement of the semiconductor industry's needs and the various trade-offs and sacrifices required in attaining them. Although there have been various studies of these needs, such as greater access to capital, liberalized foreign markets, removal of regulatory constraints, particularly export controls, and more effective legal protection of industrial property such as microcodes, there has never existed an effective process to integrate and implement these recommendations, nor one that would actually reward a confederation of interests. For the first time the key actors in the industry, the relevant Congressional committees dealing with finance, science, technology, the Commerce, State, and Defense departments, the USTR and the Patent Office would be forced to confront each other and come to some accommodation. Since the process would be very visible, these agencies would not be inclined to sabotage each other's actions. From the fray, an integrated strategy could emerge.

Among the virtues of a negotiated investment strategy is its flexibility and adaptability to the needs of the participants. It is important that these qualities not be lost with ratification. Thus the implementation of the agreement needs to be closely monitored. Just as interests changed before ratification, it is reasonable to expect that old concerns will change after ratification, and new ones will emerge. A mediator should be retained to assist where later conflicts arise or parts of the agreement cease to serve their original functions. To preserve its flexibility, it would be unwise to enact the agreement itself into law, even though many of the terms and conditions will

require legislative or administrative acts. In most cases the agreement would expire within a few years, and if necessary, the negotiation could begin anew.

Since the primary purpose of the NIIS is to promote economic growth in as fair, stable, and efficient a way as possible, it is very useful to build into the process a means of evaluating whether it achieved these objectives. For this reason, at the conclusion of a negotiation, a relatively neutral body, perhaps the Office of Technology Assessment (OTA), should be commissioned to study the impact of the targeted industry on growth. The review might cover a 5–10 year period, and analyze the specific pathways and patterns of technological change. OTA has already completed various reports on the electronics industry, but it has rarely focused specifically on the issue of economic growth. Such assessments would help significantly to refine the Trigger Method and strengthen other negotiations based on it.

Critics of the proposed mediated negotiation have already begun to raise serious fundamental objections.²³ Because no one has yet attempted a mediated negotiation for strategic industries, there is no way to disprove or corroborate the contentions of these critics. The analyst can only face their challenges head on.

As Ellis Hawley notes, the United States' past attempts at associationalism have almost invariably played into the hands of monopolists, the most high-spirited policies distorted to undemocratic, oppressive, and unresponsive ends.²⁴ Why should the NIIS, which appears to trample on the very spirit of antitrust, be different?

The NIIS is distinguishable from Hoover's associationalism or the excesses of the New Deal. The NIIS is not a scheme to bolster presidential power at the expense of the judicial and legislative branches. In fact, one of its principal virtues is that it takes the existing balance of power and governmental interests as given. The history of the implementation of the National Environmental Policy Act suggests the difficulties of forcing mission-oriented agencies to consider new interests or to amend their basic directions. This result would

not be necessary in the NIIS, since each agency or division would need to represent only an existing interest or constituency.

Associationalism resulted in the circumvention of significant minority interests. By contrast, the NIIS is designed to assure the inclusion of most affected interests. Where decisions affecting these interests are today scattered and covert, the NIIS may force these decisions into the open. Moreover, a mediated negotiation involves clear procedures for participation, and opportunities to challenge an agreement before and after its ratification. Unlike the drafts of the industry committees in the 1930s, an agreement under the NIIS could not be imposed by fiat.

An NIIS also seems fair in substance. In theory the agreement will reflect as perfectly as possible the participants' best statement of their collective benefits. In other words, the parties should not be able to invent a better solution.

The NIIS may possibly also address the interests of future generations more effectively and at an earlier stage than the existing political process. Many observers fail to grasp how negotiation itself can actually help transform the negotiators' basic values. The participants' positions of course will reflect their perceptions of self-interest. Bargaining will force them to confront the social consequences of various options and work these options through to a reasoned consensus. In the past, law has had an analogous transformational influence. During the days of the civil rights movement, the courts not only helped to vindicate the claims of black Americans, they also incrementally transformed the values of the entire society by describing and expanding the social consequences of various actions.²⁵ The same transformation occurred in Japan during controversies of the 1950s and 1960s.

This creative function of the negotiations and the diverse number of participants can offer an effective means of facing the adverse consequences of a strategic industry's development. In this sense the negotiations will serve as a device for technology assessment. If part of the steel industry, for example, wants to introduce robots, it would no longer be a

foregone conclusion that many workers will need to be sacrificed. The NIIS could address this problem and a specific solution might be found. If other sectors demanded new jobs, the parties would labor collectively until they invented them.

It is true that the NIIS may override some interests, and here the critics may have a strong foothold. Not everyone can participate in all circumstances, not every claim can be honored, not every dissident appeased. For many, the NIIS will be able to offer only compensation. Yet this may be more than these interests receive under the existing political system. There is no way to give everything to everybody. This is the basic shortcoming of democracy.

The critics next assert that the NIIS is impractical for the following reasons: it is overly centralized; the process will become unwieldy by including so many interests; "losers" will sabotage the negotiations; partisan politics will engulf the proceedings; successful firms will ignore the negotiations; bargaining will be excessively costly; an unsuccessful negotiation will waste everybody's time.

As explained, the NIIS is presented as a first model of how bargaining might proceed at the national level. It would not be necessary, or even desirable, for state or local negotiations to be subsumed within the national negotiations. Indeed, these local discussions could complement national negotiations and offer a rich source of experimentation.

The NIIS involves a tension between administrative feasibility and equity. On the one hand, it is designed to include as many interests as legitimately seek to participate. On the other, the more interests that become involved, the more unwieldy the process becomes. The solution is that a balance can be struck by segregating the interests and focusing the issues. Not all interests need participate on every issue. Not every issue has to be discussed at the same time. By careful preparation of the agenda and by pyramiding and aggregating interests the problem of management can at least partially be addressed. Negotiations in other settings, involving even large numbers of participants, have proceeded smoothly.²⁶

Because the NIIS appears so ambitious, some may wish to

test it. An initial negotiation could focus on the most immediate problems of a specific industrial segment; they need not encompass an entire industry. These early efforts would build trust and experience with the process that could support more elaborate future negotiations.

Few can hope to change human nature, and when issues are hard fought and defeat appears certain, losers often resort to sabotage. A democracy possesses ineffective means of preventing sabotage, although it does have ways of checking it. Disappointed interests have two basic ways of undermining the process, by law and by politics. If the NIIS offers a fair and open process in which all interests can participate, the claims of disgruntled interests will carry less political clout. The concerns of most similarly situated interests would be adequately addressed; others would be compensated. Only the most arbitrary claims would be dismissed altogether.

As noted, the NIIS would be supported by various procedural rules regarding standing to sue and judicial review. These are described below. In general, only those who actually participated would have standing. Those excluded would have to show that their exclusion was somehow arbitrary. In most other respects, the NIIS would follow existing administrative procedures.

Another objection is the process's vulnerability to partisan politics. If the Office of Strategic Industries were under the President, what would prevent the party in power from manipulating the process by controlling the appointment of the mediator, rigging the terms of the offer, or excluding disfavored participants? Although there would be no way to insulate the process entirely from politics—should this even be desirable—there is little chance that such actions could succeed. The AC could check the most rapacious of partisan gambits. More significantly, if the President, or his staff or party, excessively manipulated the process, this would be discovered, and it is unlikely that an agreement would be reached. A government that saw enough value in the process to initiate it would be less willing to engage in actions to subvert it.

Why should anyone take the NIIS seriously? It is relatively

easy to see why an unsuccessful firm might look anywhere for a handout, but what does the NIIS offer an industry's leaders?

If the country begins to experience serious economic difficulties, even the winners may recognize the need to secure special benefits and the process's appeal will increase. The industry's trust in the NIIS will also be enhanced, irrespective of the state of the economy, by the quality of the mediators, a presidential mandate, and the success of past negotiations. Each successful negotiation sets a good precedent for future action, and thereby providing stability.

In the end, however, as the illustration for the semiconductor industry suggests, the NIIS holds the leading firms in its grip only so long as they perceive it more in their interest to bargain than not. The incentive to participate comes from the prospects of additional gains, the reduction of existing costs such as lobbying or legal fees, or from the fear that competitors will somehow secure an advantage.

An unmeasured, empirical question is how administratively costly the NIIS process will be. The negotiations will demand time, energy, and resourcefulness, and the history of the labor field suggests that the administrative costs of bargaining often significantly exceed theoretical expectations. Yet the costs of NIIS may be less than those of ad-hocracy, proposals for comprehensive economic planning, or organizational changes in the American bureaucracy.

What if the parties to a negotiation fail to reach agreement? Although before abandoning the negotiations the parties may still have options, such as altering the format or replacing the mediator, failure is always a possibility.

It would be wrong, however, to conclude that even if the parties failed to reach consensus, the process wastes time. Bargaining helps the parties better understand the problems of their industry, exposes them to new opportunities, and prepares the government to take effective future action. The failure to reach agreement would also be an important signal that for the present, negotiation might not be an appropriate means of allocating resources to the designated strategic in-

dustry. This is the kind of market signal that many economists insist is necessary.

Difficult legal and other problems will also arise in the implementation of NIIS. The most obvious is antitrust. Apart from the serious antitrust policy questions the negotiations present, will the NIIS not greatly increase the likelihood of price fixing, territorial allocation, and other illegal anticompetitive practices? Since the parties to the negotiation will probably at times discuss competitively sensitive subjects like price, costs, and profits, it would seem appropriate for representatives of the Antitrust Department of the Justice Department to monitor the negotiations. Although the participants themselves would require a statutory immunity from antitrust liability, any such immunity needs to be limited. Given the many cultural, legal, and other differences between the United States and Japan, the *de facto* immunity conceded to the Japanese machine-tool cartel is a dangerously overbroad and unwise precedent for the United States. Since final agreement would need to be approved by the government, a substantial part of the constitutional problems arising within the bargaining sessions could probably be controlled.

A second issue is the limitations on agency participation in closed sessions. Under the Federal Advisory Committee Act (FACA),²⁷ the negotiating group would have to be established as an advisory group, notice of advisory committee meetings would need to be published in the *Federal Register* and other appropriate media, and the meetings would have to be opened to the public. FACA would require permission from the participating agencies every time the negotiators wished to convene in executive session. In the negotiated rule making currently underway with the EPA, the parties obtained FACA permission (called an FACA charter) only after great difficulty with the various limitations. If NIIS is to be implemented smoothly, FACA will need to be modified to provide less cumbersome procedures for closed meetings.

Judicial review is a third problem. Although the NIIS should reduce the need for judicial challenges, since those who are

most likely to bring suit are the architects of the agreement, at some point judicial review must be available. As suggested, the point at which a final draft agreement is published seems appropriate. Any earlier point would doom the process to collateral attacks causing serious delays and undermining trust. In general, actions by the participating agencies based on consensus and within their jurisdiction should be sustained. Actions beyond jurisdiction or diverging from consensus would be subject to traditional standards of review.

NIIS also raises procedural questions and issues of delegation of power. The most serious procedural issue is whether the NIIS would be subject to various agencies' rule-making procedures that grant the public an opportunity to comment. If so, the notice and comment procedures could conceivably disrupt or delay the negotiations. Although in theory this constitutes a serious obstacle, in practice it is more likely that it would not. The NIIS could either entirely supplant the notice and comment process or, more simply, the draft NIIS agreement could serve as a draft for the agency's rule-making review.

In the past, the courts have ruled that it is inappropriate for an organization consisting primarily of private citizens to wield regulatory power. The starkest example of such hostility arose when the Supreme Court rejected many of the innovations of the New Deal. Since Roosevelt, however, there have been many examples where regulatory boards including private citizens have been upheld. Moreover, in an NIIS, since the governmental agencies and the Congress would retain final authority, delegation should not be a serious impediment.²⁸

Conclusion

Declining rates of production, increased faltering competitiveness, and other economic ills will not be allayed, as the advocates of a national industrial policy allege, by more or better coordination of government. These will not be re-

moved even by inspired leadership, much less by appeals to morality, generosity, or fellowship. Such views miss the more fundamental problem: how to construct a process that makes it in each person's perceived self-interest to seek joint gains by negotiating with his or her fellow. This awakened self-interest must begin at home, in communities, across industries, and throughout the society.

Chapter 3 pointed out the costs of adhococracy—the misallocation of public resources for R&D, the rising costs of capital, the ineffectiveness of current tax and other legislative remedies, the polarization of labor relations, the obstruction of innovation by haphazard regulation, the government's insensitivity to the uses of statistics, the importance of rapidly diffusing technological information in the promotion of strategic industries, and finally the waste of reduplicative state and municipal programs.

The NIIS may represent a viable means of addressing all these issues in the context of specific strategic industries. It is at least a worthy experiment. In place of adhococracy it would establish an overall framework: government R&D and procurement could be tailored to specific situations where they are most needed, rather than spread haphazardly over a range of industries. The rising cost of capital would be treated both as a generic problem as well as one that today is particularly onerous to specific sectors. The most irrational regulatory rules could be ferreted out and redesigned as they are in most other countries, to maximize protection of special minority interests with the overriding needs of the majority; new copyright, patent, and other legal regimes would be designed sensitive to the economic and technological conditions that exist in rapidly growing industries. The NIIS would encourage a depolarization of management and labor under more flexible, less adversarial conditions than obtain in the collective-bargaining structure of many industries. And it would also stimulate local communities and states to save scarce resources by realigning their interests. Lastly, public bargaining across a spectrum of strategic industries will accelerate the information exchange and technical diffusion

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that we have seen throughout history have proved critical elements in economic growth.

These are formidable virtues, but the proposal is incomplete in one crucial respect. The United States can no longer plot such schemes in isolation, heedless of the interests of other countries, as it might have forty years ago. It is the wonderful paradox of the modern age that our adversary's loss is our loss, his gain, our gain. This principle gives insight into coping with the coming conflicts with Japan.

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