REITH LECTURES 1966: The New Industrial State

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Lecture 1: Planning and Technological Imperatives

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Let me begin with a word or two about what I plan in these lectures. You must know that all lectures consist, in approximately equal parts, of explanations by the lecturer of what he intends to do, what he is doing, and what he has just done. I must conform strictly to tradition.

The last seventy years, and especially those since Hitler's war, have been a time of great change in the basic arrangements of economic life. Merely to list these changes will assure you that I have a firm grasp on the commonplace. Machines have extensively replaced crude manpower, and one machine increasingly instructs other machines in the process we call automation. Industrial companies or corporations have become very large. They are no longer directed by great entrepreneurs as a right of ownership. They are guided impersonally by their staff. They deploy large amounts of capital much of which they derive from their own earnings. This is now the important modern source of savings. We do not allow income needed for industrial expansion to get into the hot and eager hands of those who might use it for personal consumption.

Economic production and well-being have also greatly increased even in countries such as Britain which have an endemically bad conscience about their performance. In the world of Alfred Marshall—say, up to the first world war— prices were established, to use Marshall's words, by the 'higgling and bargaining' of the market after having been 'tossed hither and thither like a shuttlecock'. In the world of the large companies they are set by the sellers and often remain fixed for long periods of time. These companies are also at considerable pains to persuade the customer what he should buy—everyone agrees on consumer sovereignty in principle but that does not mean that anyone trusts it in practice.

Finally, even in countries such as the United States, where faith in free enterprise is one of the minor branches of theology, the state plays an increasing role in affairs. It stabilizes aggregate demand or purchasing power; it underwrites expensive technology such as the development of supersonic transports and similar misfortunes; it restrains wages and prices to prevent inflation; it provides the technical and presumptively educated manpower that modern industry requires; and it is the state that buys upwards of a fifth of all that the economy produces. It is fascinating to reflect that in the allegedly unplanned and capitalist economy of the United States the state plays a very much larger role in almost every facet of economic activity, including the share of all goods produced and consumed, than in the avowedly planned and socialist economy of India. Evolution may well be a better source of socialism than ideological passion.

First of all, in these lectures, I want to put these changes in orderly relation to each other. I want to show that they are part of an interrelated complex of change—a matrix, as economists say. Thus, by way of illustration, technology means large commitments of capital, a great elapse of time between the initiation of production and its completion, extensive reliance on specialized manpower, intricate organization and —as an ultimate consequence— diminished effectiveness of the market. And the market is replaced by planning. These are the matters for this lecture, or such of it as remains. Next week I will look at the large corporation as a planning instrument. Thereafter (changing the order of the third and fourth lectures as originally publicized), I will consider the techniques by which the individual is made to conform to the planning process—how our behaviour is guided so that we will not, by undue independence of will, upset the convenience of those who serve us. I will then look at the role of the state in this planning; at the way this planning manifests itself in socialist and avowedly non-socialist, - and developed and less developed, economies; and finally there is the question of where it is all leading and what is its cultural impact.

The Plot Disclosed

In a lecture, unlike fiction or the theatre, there is no harm in a premature disclosure of the plot. I hope in these lectures to show three things. They are:

> (1) That all industrial societies must plan, which is to say they must manage the lives of those whom their industries are assumed to serve. By its nature, the modern industrial economy is a planned economy.
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> (2) That, in consequence, there are strongly convergent tendencies as between industrial societies. This is despite their very different billing as capitalist or socialist or communist from those who so willingly serve as the custodians of our official ideology.
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> (3) That to a far greater extent than we imagine our beliefs and cultural attitudes are accommodated to the needs and goals of the industrial mechanism by which we are served.

Having made these points, I shall be concerned to show how our lives are limited and arranged by the beliefs that are imposed by industrial priority and need. I shall argue that our fate, in this respect, is not wholly different, except as to the method of the control of our minds, from that of other planned societies. And I shall end by suggesting, in a very preliminary way, some of the means for our emancipation. Of these, the most important is a clear view of the sources of our social beliefs, their sources in industrial convenience and need.

But now let me begin by showing how technology, and its related requirements in time and capital, shape the modern economy. I draw here on an American example but one which will not seem strange to a British audience. It involves the Ford Motor Company. Henry Ford, like Albert Schweitzer, Bertrand Russell, and Marcel Proust—whom he did not at all resemble, was a distinctly supra-national figure, as he would himself have been the first to agree.

On June 15, 1903, after some months of preparation, the Ford Motor Company was formed in Detroit for the manufacture of automobiles. The first car reached the market that same October. The firm had an authorized capital of $150,000, or rather less than £30,000 sterling at the then rate. However, only $100,000-worth of stock was issued and only $28,500, or about £6,000 of this was for cash. Although it does not bear on the present discussion, the company made a handsome profit that year and did not fail to make large profits for many years thereafter. Employment in 1903 averaged 125 men.

In the spring of 1964, the Ford Motor Company introduced what, in these days, is called a new automobile. In accordance with current fashion in automobile nomenclature, it was called, one hopes inappropriately, a Mustang, for a mustang is a very rough-riding animal, as all close students of television are aware. Preparations required three and a half years. From late in the autumn of 1962, when the design was settled, until the spring of 1964, there was a fairly firm commitment to the particular car that eventually emerged. Engineering and 'styling' costs were $9,000,000, or rather more than £3,000,000; the cost of tooling up for production of the Mustang was $50,000,000, or some £18,500,000. In 1964 employment in the Ford Motor Company averaged 317,000—compared with the figure of 125 I have quoted. Assets were approximately $6 billion or about £2,200,000,000.

Technology means the systematic application of scientific or other organized knowledge to practical tasks. Virtually all of the effects of increased use of technology are revealed in one way or another by these comparisons. Let me list them.

First, with increasingly sophisticated knowledge, an increasing span of time separates the beginning of the task from the end. Organized knowledge is not brought to bear on the manufacture of a car as a whole. It is brought to bear on very small elements of the task—on the qualities of particular steels or the methods of machining a particular part. Then it is brought to bear on the combination of these elements of the task, and then on a further combination, and thus on to final completion. The process of manufacture stretches back in time as the root system of a plant goes down into the ground. The longest of these root filaments determines the total time required in production.

The First Ford Car

The manufacture of the first Ford was not an exacting process. Ordinary steels were used. Metal could be obtained from the warehouse in the morning and shaped or worked that afternoon. The provision of steel for the modern vehicle, in contrast, reaches back to specifications prepared by the designers or in the laboratory, orders to the steel mill, design of the appropriate metal-working machinery, and production and installation of these tools. The result: months and years elapse between beginning on a car and its appearance.

Second, there is a great increase in the amount of capital that is committed to production. This is partly the result of the increased lapse of time and, hence, of the increased investment in work in process. But the knowledge which is applied to the various elements of the task also costs money. Typically, also, the application of

knowledge to a process involves the development of machinery—the machine is the most characteristic manifestation of technology. This too costs money.

Only slight knowledge and simple machinery went into the manufacture of the first Ford. No trained engineers were used. The frame of the car was moved manually; it helped that it could be lifted by two men. The modern auto factory, hi contrast, is itself a complex and closely articulated machine. Nothing is done by muscular effort. Computers control the flow of parts and components. Only the hideousness o the product, on occasion, reminds us that human beings are involved. We see here one reason for the increase in capitalization of Ford from £30,000 to £2,200,000,000.

Third, with increasing technology, time and capital tend to be committed ever more inflexibly to a particular task. Organized knowledge is used to improve the performance of a task. That task must be precisely defined before it is divided and subdivided into its component parts. Knowledge and equipment are then brought to bear on these fractions. But they are brought to bear only on fractions of the task as it was initially defined. If that task is changed, new knowledge and new equipment will have to be brought to bear on these fractions.

Diversity in Tooling

The Dodge Brothers' machine shop, which made the engine and chassis of the original Ford, did not specialize in particular products. It could have worked as well on bicycles, steam engines, or carriage gear. And, in point of fact, it had been so employed. Had Ford and his associates decided, at any point, to shift from gasolene to steam power, the machine shop could have accommodated itself to the change in a few hours.

By contrast, all parts of the Mustang, the tools and equipment that worked on these parts, and the steel and other materials going into these parts, were designed to serve efficiently their ultimate function. They could serve that function alone. Manufacture of a Barracuda, a rival car which differs mostly in having an even more bizarre name, would have required a very different 'tooling up'. A Serpent, a Roach, or a Locust—if I might suggest a few names to the motor manufacturers —would each have had its own specialized tooling.

Fourth, technology requires specialized manpower. Not surprisingly organized knowledge can be brought to bear only by those who possess it. However, technology is not the only thing that requires specialized manpower; so does the planning which I will mention in a moment. And so does the organization which results from specialization.

The talent required for modern industry is not necessarily more demanding, on some absolute scale, than that of an earlier and technically less advanced era. Modern industrial man is not a species of superman. He must be helped to resist the temptation so to regard himself. The makers of the original Ford were men of talent. The Dodge brothers had previously invented a bicycle and a steam launch. Their machine shop made a wide variety of products. Detroit legend also celebrated their imaginative exuberance when drunk. James Couzens, Ford's partner, who almost certainly had more to do with the eventual success of the enterprise than Henry Ford, had a

background in railroading and the coal business. He went on from Ford to be Police Commissioner and Mayor of Detroit and a famous Republican Senator from Michigan who was noteworthy, among other things, for being an undeviating supporter of Franklin D. Roosevelt, a Democrat. Not all members of the present Ford organization are as versatile. What its members do have is a considerably deeper knowledge of the specialized matters for which they are responsible. It is a great assemblage of such specialists.

Fifth, specialization requires organization. This brings the work of specialists to a coherent result. It is obvious that if there are many specialists, this co-ordination will be a major task. So complex, indeed, will be the job of organizing specialists that there will have to be specialists on organization. Along with machinery, massive and complex organizations —or corporations—are another of the highly visible manifestations of a world of advanced technology. Thus, in part, the growth of Ford from 125 to 317,000 men.

Sixth, it follows from the time and capital that must be committed and the rigidity of these commitments that there must be plan. fling. Tasks must be so performed that they are right not for the present but for the point in time in the distant future when they are completed. Developments occurring between the present and the time of accomplishment, and affecting the latter, must be anticipated. Their effect, if adverse, must be neutralized; or they must be prevented from occurring.

In the early days of the Ford Motor Company, the future was very close at hand. What was raw metal today would be a car next week. To fail to anticipate adverse contingencies was not fatal; anything that went unexpectedly wrong could be quickly remedied. The earliest vehicles, as they came on the market, did not meet with complete customer approval; the cooling system did not always cool, the brakes did not always brake, and the carburettor did not always feed fuel to the engine. Once a Los Angeles dealer reported the disconcerting news that when steered, the ‘front wheels turn wrong ‘. These defects were promptly remedied. Such unforeseen faults in the Mustang would have been highly unpleasant and very, very costly.

Similarly, the original Ford used materials, labour, and components of a highly unspecialized character that, accordingly, were available in the open market. A shortage could be remedied by sending someone out to buy what was needed. A failure in delivery for the specialized machinery, materials, or components required for a modern vehicle would be subject to no such remedy. So with labour: an ordinary labourer or even a machine operative could be found at the nearest saloon; a systems engineer cannot be so recruited. Nor can other specialized talent.

Here I come to a point of transcendent importance—and one to which I will return. Not only technology, and associated change, require planning. Modern technology also impairs or destroys the market. Simple things can be bought and sold on the market; complex things cannot. The farmer can find his production needs in the next market town; the automobile manufacturer cannot. There was an open market for muskets. There is not, happily, for missiles. Orville Wright was able to buy most of what he needed for his first aeroplane in Dayton, Ohio. The market will not supply the materials, parts, systems, and engineering talent required for a modern spacecraft.

These must be foreseen months and years in advance. Their supply must be arranged, and so must their price.

I have illustrated the imperatives of modern technology—the requirements in time, capital, inflexibility of commitment, specialization, organization, and resulting planning—by reference to the automobile. This, by many standards, is a rather elementary product. All of the tendencies I have just described are greatly intensified when one gets, for example, to modern military weaponry. This is especially so as regards time and cost.

Thus, when Philip II settled on the redemption of England at the end of March 1587, he was not unduly troubled by the seemingly serious circumstance that Spain had no navy. Some men-of-war were available from newly conquered Portugal; but, in the main, merchant ships would suffice6. In other words, even a navy could be had from the market. Nor was the uncouth action of Drake at Cadiz three weeks later, which cost him many of his vessels, a fatal blow. Despite what historians have always described as unconscionable inefficiency and delay, the Armada sailed in a strength of 130 ships a little over a year later on May 18, 1588. The cost, though considerable, was well within the resources of the Spanish Empire.

To create a modern fleet of the numerical size of the Armada, complete with aircraft carriers and an appropriate complement of aircraft, nuclear submarines and missiles, destroyers, auxiliary and supporting craft, and bases and communications, would take a first- rate industrial power a minimum of twenty years. Though modern Spain is rich beyond the dreams of its monarchs in its most expansive age, it could not for a moment contemplate such an enterprise. This will be very reassuring in Gibraltar. In the Second World War no combat plane that had not been substantially designed before the outbreak of hostilities saw actual service. Since then, the lead time for comparable weaponry has become much greater. In general, no one in late middle age stands in danger of weapons now being designed; they are a menace to the unborn and the unconceived and, for that matter, the inconceivable.

It is a commonplace of modern technology that there is a high measure of certainty that problems have solutions before there is knowledge of how they are to be solved. It is reasonably certain, as I speak, that a man can be landed on the moon within the next five years. However, many of the technical details of this journey remain to be worked out. It is known that air and water pollution can be more effectively controlled for those who are not so fortunate as similarly to escape. There is still much uncertainty as to the best methods of cleaning up the atmosphere and water. That commuters can be moved, in safety, speed, and some comfort, into American cities is certain. How to do so is still to be determined.

If methods of performing the specified task have been fully worked out, it follows that the need for bringing organized intelligence to bear on the task will be less than if the methods are still uncertain. And this uncertainty will lead, in turn, to increased time and cost. These increases can also be very great. Uncertainty about the properties of the metal to be used for the skin of a supersonic transport; uncertainty therefore about the proper way of handling and working the metal; uncertainty therefore about the character and design of the equipment required can add extravagantly to the time and cost of obtaining such a vehicle. This problem- solving, with its high costs in time and

money, is a recognized feature of modern technology. It graces all modern economic discussion in the United States under the cachet of Research and Development.

The need for planning, it has been suggested, arises from the long period of time that elapses during the production process, the high investment that is involved, the inflexible commitment of that investment to the particular task, and the failure of the market with high technology. In the case of advanced military equipment, time, cost, and inflexibility, of commitment are all very great. Time and outlay will be even greater where methods are unknown or uncertain and where, accordingly, there must be expenditure for research and development. In these circumstances, planning is even more essential. It is also more demanding. The time that is involved, the money that is at risk, and the number of things, accordingly, that can go wrong and the magnitude of the possible ensuing disaster all increase. The difficulty may be beyond the capacity of a private firm to resolve.

One answer is to have the state absorb the major risks. This is now commonplace. The state can guarantee a market for the product. And it can underwrite the costs of development so that if they increase beyond expectation the firm will not have to carry them. Or it can make available the necessary technical knowledge. The drift of this argument will be evident. Technology leads to planning. And in its higher manifestations, it puts the problems of planning beyond the reach of the industrial firm. Its compulsions, and not ideology or political wile, will require the firm to seek the help and protection of the state. This is true under what has always been called capitalism. The state performs the same role, as a matter of course, in the formally planned economy. Technology and associated changes force .planning on both. This is a tendency, obviously of no small interest, to which I will also return.

I do not want to attribute too much to technology. As noted, it has an initiative of its own. Accordingly, it is the point in the complex of modern economic change at which it is most logical to break in. But technical change is not only a cause of change; it is a response to change. Though it forces specialization, it is also the result of specialization. Though it requires extensive organization, it is also the result of organization. Though it leads to planning, it is the fruit of planning. Such is the nature of the mould of interrelated change we are examining in these lectures.

Here I must stop for now. The late Fiorello LaGuardia, when Mayor of New York, used to end his public speeches by calling, somewhat irrelevantly, for patience and fortitude. He liked the sound of the words. They are not so irrelevant for a lecture on economics. For those with the patience and fortitude to return next week, I will return to the notion of planning. I want to define it more precisely and explain more clearly why it becomes inevitable with advanced technology and related change. Then I will discuss the modern large company or corporation which, with the state, is one of the two instruments for doing the planning that modern change makes necessary.