Strengthening the Basis of National Security

The Board of Directors* of the American Association for the Advancement of Science

Those charged with safeguarding the United States have sought to minimize the danger of internal subversion through the screening of government employees and persons having access to classified information. This program is necessary, but it poses a serious dilemma: the more completely we succeed in reducing the danger that information now in our possession may leak to a potential enemy, the more risk we run of interfering with scientific progress and of reducing the technologic superiority and the moral and physical strength upon which victory in the ultimate test would depend. The inherent dangers of this dilemma can be lessened and our strength enhanced by changing our basic concept of internal security from one that attempts almost exclusively to minimize our losses to one that places greatly increased emphasis on maximizing our gains.

OUR purpose is to analyze the policies on which the nation's security-screening program is based and to suggest two ways in which these policies could be changed to make them contribute more positively and effectively to the strengthening of the United States and the nations of the free world. Four points seem basic to a consideration of the security program.

1) A security-screening program is made necessary by the peril of the times. Espionage and sabotage, the communication of classified information to unauthorized persons, and infiltration by enemy agents and sympathizers must be guarded against. No prudent government could take any other course.

2) Examinations of the character of persons likely to be entrusted with vital information must go beyond a determination of loyalty. A person may be of unquestioned loyalty and still be a risk. If he is careless, if alcohol loosens his tongue, if close relatives in territory under enemy occupation make him subject to pressure, then to give him access to vital information endangers the nation, even though his loyalty is unchallenged.

3) The security program is for the protection of the whole community. It is true that many scientists have a special interest in the security problem, for the intimate dependence of military strength upon scientific progress means that security-screening affects them more than it does most people. But the welfare of the nation must be the controlling factor, not the interests of an individual or the welfare of a particular group. The policies must be comprehensive, and their application must be impartial.

4) Security-screening programs are a means to an end rather than an end in themselves. Their purpose is to conceal plans, to thwart enemy intelligence efforts, and to assist in the development and maintenance of such scientific, technologic, and industrial preeminence as will protect us against the danger of successful attack. Security-screening measures play an important role in that process, but the role is inherently a defensive and negative one. Such measures keep a potential enemy from learning some facts about our armed force, but they do not increase the size of that force. Temporarily they keep an enemy from learning the characteristics of weapons being developed, but they create no new weapons.

The last of these four points needs more extended consideration, for it has not been discussed as much as have the other three, nor have its implications been as widely considered. Basically, the issue is that secrecy is not an end that is desirable in itself but is a means toward an end. Thus the degree of secrecy, the conditions under which secrecy is desirable, and the risk of losing secrecy are all to be considered in terms of their contribution to the development and maintenance of the military, industrial, and moral strength which are our ultimate protection against effective attack.

The role of secrecy in defense has, for reasons that are historically obvious, been developed in a military setting in which the concept of maintaining security through secrecy had validity. Communication codes, troop strength and disposition, strategic plans, and other such information can be kept out of enemy hands, at least temporarily, by adequate security safeguards. Although such information eventually becomes obsolete, or is compromised through operational use, until this happens secrecy is proper and effective.

But a new situation confronts us now that military strength depends so essentially upon science, for scientific knowledge cannot be kept secret by the security practices that serve to safeguard military information. Progress in science is a cumulative process in which each scientist builds upon what is already known; through research and intellectual effort he adds his bit to scientific knowledge. National boundaries and security systems simply cannot contain this process. Scientific knowledge will continue to grow as long as men are curious about the world around them. The state of learning in a nation affects the rate of scien-

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tific progress; and the state of technology affects the speed and volume with which a nation can translate scientific findings into practical applications, be those applications of a military or of a peaceful nature. In scientific knowledge one nation may lead another, and in the application of scientific knowledge to military problems one nation may progress along lines not yet recognized by another as being feasible or important. When this is the case, security precautions may provide an advantage of time. But among advanced nations the difference is of time only. The basic fact is that there simply are no such things as permanent scientific secrets. Even the time difference is sometimes lacking; recent decades have been filled with instances in which the same fundamental discovery or the same military application appeared practically simultaneously in two or more countries.

Once it is recognized that there is no such thing as a permanent scientific secret, the whole picture changes. If security demands scientific superiority, and if superiority cannot be achieved by attempts to keep scientific progress secret, then how can superiority be achieved and maintained? Clearly the security of the nation requires the most favorable circumstances for the advancement of science, an environment that will foster a healthier, more imaginative, more energetic development than that which serves the enemies of freedom.

The truth of these ideas has not yet been generally recognized. In fact, the belief is widely held that, by taking sufficient precaution, we can safeguard the scientific secrets now in our possession, and that taking these precautions is therefore the most effective means available of maintaining our national security. These beliefs have led to the negative concept of security that is in current use. This concept assumes that we possess secrets that give us an edge of superiority. It assumes that the loss of a few secrets is likely to mean the difference betwen success and failure. But instead of trying to determine what information is of such critical importance, it is assumed that we must safeguard the security of large amorphous categories of information.

So pervasive has this type of thinking become that it has blurred the distinction between information that is vital and information that is not, between that which can be kept secret and that which cannot. There remains, of course, a proper role for secrecy to play. The disposition of troops and plans for troop movements, the kinds and capabilities of new weapons and the plans for their use if necessary—all such information obviously should be protected, and the relatively few people who must have access to it clearly need to be carefully screened. Under certain circumstances this may also be true of scientific knowledge. It is quite possible that an important scientific discovery that has profound implications for defense is made during a time of emergency. The time of discovery is thus sometimes an element, and under such circumstances the discovery should be held secret until it is known that a potential enemy also has it. These cases involve the difficulty of deciding between the advantages of classifying a discovery and the advantages of giving it to the scientific community. The burden of proof that a discovery should be classified rests squarely on the classifier.

But not all knowledge belongs in the classified category, and—admitting that the categorization is sometimes difficult—for such information as does not, the emphasis in our thinking should be on the positive side of progress rather than on the negative side of secrecy. With scientific knowledge advancing in many countries, as it most certainly is, our major effort should be on further progress and more advanced application instead of upon preserving the secrecy of the scientific knowledge we already have. We cannot possibly keep scientific knowledge secret; but we can hope to keep ahead of our potential enemies in basic knowledge and in the application of that knowledge.

A positive program of preserving national security by keeping ahead would substitute the question *How can we best aid national progress?* for the negative question *How can we avoid the danger of leaks?* Instead of asking *How can we minimize our losses?* it would ask *How can we maximize our gains?* If—as is likely—we should be numerically outnumbered, our superior strength must come from making better use of the material and human resources we do have. It follows that ability to make positive contributions to the nation's welfare and progress should be a primary criterion of a person's suitability for any position other than positions involving access to the types of information that must properly be closely guarded. We do not find that this criterion is now, in actual practice, the primary one. It is necessary to ask *What security risk is incurred in employing this person?* But it is also vital to ask *What risk of delayed progress or diminished achievement is incurred in not employing him?* Granting the obvious fact that every person is to some extent, however small, a security risk, screening boards are faced with the difficult task of assessing the size of the risk and then balancing that risk against the gains that may accrue if the risk is taken. It appears that in practice the potential gains have been given little consideration, while great emphasis has been placed upon the risk.

We propose two changes. First, that greater weight be given to a man's potential contributions. The risk involved must still be considered, but for any given position we can afford a larger risk if we stand to make a great gain than if we can expect only a small one. The difficulties of determining and properly weighting the positive factors which should be given greater consideration are clearly great. But scientists would welcome the opportunity to cooperate with government officials in developing appropriate standards and procedures. Even with such standards, decisions would be necessary; and many of the decisions would be difficult to make, for the whole man should be considered, his strengths and possible contributions as well as his weaknesses and possible danger.

Our second proposal offers much less difficulty. We

propose that the risk be measured with more regard for the nature of the work to be done than has frequently been true in the past. No satisfactory justification has yet been advanced for screening persons engaged in unclassified research, in say biochemistry, by the standards appropriate for screening those who have access to the details of war plans and advanced weapons. As a matter of logic, there is no question of security in unclassified basic research. There is a question of loyalty; both public opinion and the opinion of scientists would usually hold against the supplying of public funds to a scientist of established disloyalty. But demonstrated disloyalty, or even a strong presumption of disloyalty, is a different matter from security risk. Disloyalty is not to be tolerated anywhere, but stringent security precautions are appropriate only when the information to be guarded justifies the stringency.

The classification of basic research is likely to retard the development of both peaceful and military technology. Basic research thrives on the free interchange of ideas and information. The free discussion of research findings and methods allows criticism, permits the discovery of error, stimulates improvement, and furnishes the original clues which lead sometimes to the development of new weapons and more frequently to the development of peaceful applications of science. When the free flow of basic scientific information is stifled, technologic development must inevitably suffer, and the greatest loss is to the nation that enjoys the highest state of learning and the most advanced technology.

It is easy to overdraw the distinction between two such policies as the negative one we are criticizing and the positive one we are advocating, and perhaps we have done so. Nevertheless, there is an important difference in the effects of the two. Under a policy that attempts to maximize gains, we would encourage the interchange of scientific information; we would attempt to use as many people of high ability as we could, even though not all could safely be used in the more sensitive positions.

A policy that attempts to minimize losses leads to quite different attitudes and effects. A costly aspect of current procedures which seems to have been generally neglected in official circles and which would be largely obviated by a positive approach to security is the wastage of time and talent, the lowered efficiency, and the slowing of progress that result from the excesses of current procedures. We can afford the time that goes into the investigatory process itself. We can justify the money costs. But can we afford to have government service become less desirable, to diminish the effectiveness of research and development programs, to retard the flow of information to and among our own scientists, to deprive federal agencies of the help of consultants who possess important information and rare skills the agencies would like to use, or to base support for unclassified fundamental research on the political ideology of the investigator and his associates? The lowered morale, the lost time and efficiency, and the denial to the nation of the use of some persons of great talent add up to a bill of unknown but certainly large size, a bill we pay for our negative method of maintaining security. Were time, talent, and effectiveness so wasted for any other reason, those responsible would be considered guilty of sabotage of the first order.

A positive program of security can be developed. It requires boldness; it demands continued belief in the fundamental loyalty of American scientists, engineers, and industrialists and in their ability to keep the United States ahead of potential enemies. It would foster the development and effective use of the resources of knowledge, talent, and enthusiasm which can keep us ahead. Such a program would strengthen the democratic spirit of freedom and of progress which is the hope of the free world.

Human Ecology: A Problem in Synthesis*

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PEKING man, most ancient of our near kin, is not more than a million years old. The earth as a separate planet is at least 2000, perhaps 3000, million years old. The species of Pleistocene mammal to which we belong has been present for only the last 30 sec of the 24th hour of earth's existence. On this scale, agriculture and urban life are less than 0.5 sec old, while modern power technology based on fossil fuel compares with a very fast "instantaneous" snapshot.

We are an explosion. For the first time in earth history, a single species has become dominant, and we are it. The power and intensity of our pressure upon environment is without precedent. Our numbers increase at a net rate—conservatively—of 1 percent a year. This means a net gain of more than 50,000 a day, and doubling in a generation. This also means increasing demand for space in which to live and move and increasing demand for food and other necessities from the space that is left.

Man thus becomes his own rival, or rather the victim of his own rival needs. The modern landscape

* Invitation paper read for the Ecological Society of America at Gainesville, Fla., 8 Sept. 1954.