

and the high-energy physics, and the associated fields of microbiology, et cetera.

With this introduction, my definition of a scientist is a man who deals primarily with the generation of new fundamental knowledge. Whether he discovers it, or whether he creates it, we should not be concerned. We are concerned here with the end product. The scientist is primarily motivated by a desire to increase knowledge for knowledge's sake.

Now let us talk of the technologist who is often grouped with him and confused with him. The motivation is entirely different. This has led to heartburning in the Pentagon and in the military system, throughout the Government, and in many industries. The engineer has no such motivation. His primary motivation is to apply this new knowledge to the useful purpose of man.

Think of this, if you have not thought of it in your daily work and occupations, and see how differently these two people are going to react, then you will see why they had some of the internal problems of organization in the Manhattan District, and you will see why certain large industries have had their comeuppance in an effort to build R. & D. into their structures, because you are really putting two unlike motivations together, and this just cannot be done with a common plaster of propinquity. It has to have meaningful understanding on both sides.

Yesterday I had lunch with two distinguished men, one a scientist and the other an engineer, both in the NASA organization, and both highly placed. The scientist thought this was a good opportunity to state his views on how engineering education should be changed. It was an interesting discourse, but I am sorry to say I thought it impractical. I think he missed the essence of engineering education, and he was trying to do the job as a scientist would have to do it. There the education is so completely directed along the line essentially for research.

In practice, the engineer has frequently to operate vast systems. For example, he has to operate complex utility systems, and perhaps he has to be the city engineer. Perhaps he has to be the chief mechanical engineer on a railroad or an airline. Nearly always he has to deal with people. Thus you bring man into the engineering-technological field. You seldom bring man into the physical sciences. Man and his behavior appear in economics and the behavioral