

MEASURES FOR PROGRESS

A HISTORY OF THE NATIONAL BUREAU OF STANDARDS

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NATIONAL BUREAU OF STANDARDS

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FOREWORD

If men are to accomplish together anything useful whatever they must, above all, be able to understand one another. That is the basic reason for a National Bureau of Standards.

True, men may get together themselves and agree on terms and definitions. Those who make screws may, for example, agree to avoid confusion by manufacturing a common range of sizes and thread numbers. But in broad areas the only possible way of securing agreement is by authoritative action by an agency of the Federal Government. The early history of the confusion in this country demonstrates this clearly.

There is also a genuine difference between the setting of fundamental standards and the practice of standardization as conducted in industry. The former has to do with definitions, with specifying clearly and exactly what technical words mean, in a fundamental and scientific sense. The latter may be concerned with commercial definitions, but it is primarily involved with the task of agreeing on limiting ranges of sizes and forms which shall be manufactured in large numbers.

The former may sometimes go too fast, but it can never go too far. As applied science ramifies there are always new terms appearing, where ambiguity or inaccuracy can hold up progress, where undue delay in forming exact specifications can slow down accomplishment. Yet too much speed can sometimes pin matters down in ways that are later found to be clumsy or expensive. It requires good judgment, and this can be applied only when there is sound comprehension not only of the science involved, but also of the ways in which it is being applied, and, more subtly, of the ways in which it is likely to be applied in the future. Sound fixing of standards can hardly occur in an ivory tower.

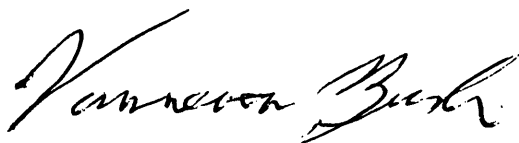
The latter can indeed go too far. The subject does not need treatment here. We have all witnessed commercial situations in which premature freezing of performance has throttled progress.

Now there is a popular fallacy about this business of setting standards. It is the belief that it is inherently a dull business. One of the reasons that I am glad to see the present history appear is that I believe it will help to dissipate this misunderstanding. Properly conceived the setting of standards can be, not only a challenging task, but an exciting one.

There are many examples of this as the history is traced. Let me mention just one. How long is a second? Certainly we ought to know that. Do we just take the time for the earth to revolve on its axis, and divide this by 86,400? The earth does not turn uniformly. Shall we use the time for the earth to complete a path around the sun? This depends, to a slight degree, on what other planets are doing in the meantime. How about the time for light to travel a measured distance? This would be in a vacuum no doubt, and the technique is difficult. There is even a possibility of becoming involved with questions of special relativity. Shall we use the time necessary for some specified atom to emit a certain number of vibrations? Now we are on sounder ground, but not entirely out of the woods. We have to be sure we have the right atom, and that we can count correctly. I am not of course attempting in this example to really explore this problem. I merely wish to indicate how deep an apparently simple question can lead.

Should an agency that is committed to the duty of setting standards also do research? I believe the answer is clear. Those who would set scientific standards wisely cannot limit themselves to working with science, they needs must work in science. Only those who are practicing scientists can grasp clearly where need for definition lies, and what constitutes useful definition.

The National Bureau of Standards has had a good history of accomplishment, and has contributed much to the scientific and technical progress of this country, to its security and well being. It is well that the story should be told. I assure you that the story will not be dull.

A handwritten signature in cursive script, reading "Vannevar Bush". The signature is written in dark ink and is positioned above the printed name.

VANNEVAR BUSH