Engineering roles and identities in the scientific community: toward participatory justice

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The communities that build and maintain the accelerators and detectors are usually associated in physics laboratories with instrumentalists that, in turn, have a considerable kinship with engineers. These communities themselves exhibit a complex structure and are divided in subcategories. Instrumentalists can be considered a subset of detector and accelerator specialists, and the watershed line between their research expertise and that of experimentalists (and, sometimes, theorists) is rather blurred. Whereas the majority of instrumentalists (and a certain fraction of pure engineers) are holders of advanced degrees, they are nevertheless considered non-scientists and are not normally allowed to contribute to running physics experiments, analyzing data or developing high-level theory [1].

There are distinctions between experimental scientists and “nonscientists” that manifest themselves throughout the course of a project. At the stage of creating experimental setups in physics, this becomes evident in the attention given to the design of the experiment. Although they both study processes in the detector on computational models, experimentalists focus more on aspects related to future searches for a useful signal (e.g. reconstruction of events occurring in the detector by triggering numerous sensors), while “nonscientists” focuson aspects related to ensuring theoverall operability of the installation. The second difference arises during operation of the setup when measurements are being made.The scientists participate in the data acquisition and subsequently process and analyze the data while the instrumentalists begin to focus on the creation of other installations and instruments.

The basis of the external distinction between engineers and scientists in a research laboratory is rooted in the orientation of their constructive activities. Engineers focus on activities that are artificial and technical in nature while scientists focus on those more closely tied to the natural phenomena under investigation. At the same time, the engineering nature of scientific labor, that which involves constructing and commissioning an apparatus, turns out to be characteristic of both scientists and engineers. Therefore, it is only the formal orientation of the activity toward artificial aspects and functional roles which, as a rule, serves as the basis for the refusal of the community to allow engineering specialists to more fully participate in experiments and analyze the data collected by them. This exclusion of engineers and other formally non scientist specializations in megascience from the most valuable roles and practices can be considered a “participatory injustice” [1, 2].

As a mitigation of such participatory injustice, I suggest an approach to overcome participatory injustice by creating joint projects for non-scientific and scientific specializations in which they cast themselves in equipollent roles. Two specific directions for the mitigation of inequity to knowledge production practices can be explored during the course of Snowmass.

The first is an implementation of Imitation Games (IG) [3]. IG implies roles of “imitator”, “honest participant”, and “evaluator”: all participants are presented with questions regarding instrumentation, running experiments, data analysis, and physics theories. “Honest participants", belonging to a certain community, answer the questions in a straightforward manner relying on their own professional expertise and gut feeling. “Imitators" attempt to answer the questions as if they belonged to another community in a manner indistinguishable from a member of that community. For example, an experimentalist “imitator” pretends they are an engineer and answers how they think an engineer would answer. “Evaluators" then try to distinguish whether the answers were fake or not and explain why they considered answers true or fake. IG can be played both in person and online and is a proven method of facilitating mutual understanding between different social groups and overcoming prejudices. As such, during the course of Snowmass, this can be developed and carried out as a community intervention both during virtual town hall style meetings and at the larger in-person gatherings.

Second, institutional barriers between communities can be lowered, and vertical mobility in the scientific community facilitated. Currently, in the US national laboratories the mobility between those on the scientist and the non-scientist tracks is almost non-existent. For example, it is incredibly challenging for an individual even with a formal scientific background but on a non-scientific track to pursue a career in a scientific direction (like data analysis or theoretical studies). Presence of rigid borders between subcommunities accompanied by sometimes arbitrary or willful criteria of ascribing researchers to either scientists or nonscientists creates participatory injustice. This needs to be alleviated in order for the entire field in the US to flourish.

References

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