



Systemic flaws cannot be fixed with minor tweaks

I read the article by Alberts et al. (1), about the malaise currently facing science and its solutions, with interest. I agree with the perceived problems, but the proposed solutions, although rational, are far too small to be called a rescue.

I believe that most of the challenges facing research are due to our organizational model. Large well-funded institutes are separated into many small laboratories, each headed by one person who is effectively a chief executive officer (CEO). These small groups are then expected to independently produce cutting edge research. Collaboration between laboratories is encouraged, but our budgets and rewards are separate, and therefore we are in competition. This structure causes many of our issues. Expertise and time are wasted as the same experiment is optimized and troubleshoot hundreds of times in the same institute, merit is hard to identify, and someone with a particular skill would be lucky should it be required in their project. In this organizational structure, there is barely any promotion; either you are on the factory floor or you are the CEO of a tiny company.

It is clear why this structure exists: in the early days of biomedical science, exceptional

individuals were able to make big advances, given freedom. The credit for breakthroughs could be narrowed down to a couple of individuals, something that I suspect is increasingly tough for the Nobel Prize committee. However, why do we persist with the small laboratory system? Yes it has been successful, but glance at other areas of advancement, such as technology. No team the size of a typical laboratory could produce an entire smartphone, let alone make a real improvement on those available today. If the technological world had been run as inefficiently as biomedical science, we would have managed to produce something much more basic, but it would still seem a remarkable success.

So, if science's problems lie with the laboratory model, what is the solution? We need a real management structure with a few senior visionaries at the top responsible for grand broad projects and the power to make them happen, and layers of seniority beneath them so that promotion is possible. We need people management, so that merit is identified and employees play to their strengths. Simply put, we need to run ourselves like

a company in the real world. I do not mean for profit or to restrict the creativity of those on the factory floor. Charities do not work for profit, yet they would never use our organization model; Google does not lack creativity, yet they don't separate into 1,000 independent workers.

The best thing about this proposal is that it would not require more funding. I, and everyone I know, truly believes that science could do far more with the current budget, if only we knew how to support our workers in performing at their full potential.

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1 Alberts B, Kirschner MW, Tilghman S, Varmus H (2014) Rescuing US biomedical research from its systemic flaws. *Proc Natl Acad Sci USA* 111(16):5773–5777.

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