

Having a slightly more flexible budgeting scheme allows for an agency to respond to infrastructure issues as they arise, and plan ahead for ones that can be seen ahead of time. Additionally, if the section of an agency's budget devoted to infrastructure is over funded, then flexibility would allow those funds to go other places, rather than the agency making stupid upgrades to infrastructure to use up those funds.

I think that a flexible budget structure would help to prevent overhead costs from squeezing out PI space. However, I can see scenarios where an agency may reallocate funds away from PIs to infrastructure concerns, but I think this is less likely in a normal year, without major upgrades.

A hard number for distribution could be problematic. At a certain point investing in infrastructure may not be the most efficient use of resources. Maybe incentivizing investment in infrastructure is important in an early reform of the hypothetical science department but once facilities reach a limit (assuming there isn't an overwhelming revolution of technology) to what infrastructure alone could enable. PI's should be motivated and inspired by federal grants to work and facilities should only be built for their endeavors. There's certainly a balance.

Also, maybe increasing infrastructure so it squeezed out PI space wouldn't necessarily be that bad, because if having better infrastructure actually increases efficiency so much, there might be less for a PI to do, or maybe money would be freed up from somewhere else that is benefiting from this new efficiency. The PI is important though, perhaps more so than some infrastructure concerns, because proper oversight is incredibly necessary for true success.

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In my opinion, the main aim of science, beyond helping us to understand reality, should be to build upon our knowledge of the world so that we might be able to advance the public good. Scientific discovery with the intention of improving all lives would involve a collective pool of knowledge and brainpower, fed into by the work of all scientifically-minded people. So, I think collaboration is an essential part of what we want science to be. We should try to foster collaboration, with some form of broad oversight that encourages even people from different disciplines to work towards shared goals for the directions we want science to take us in the near and more distant future. Simply having all facilities be built for the infrequent use of whoever was rich enough to pay for them is inefficient, especially if multiple groups are researching the same thing but in different private facilities. We shouldn't be racing to see who can make a breakthrough in a field first so they can patent it, that goes against the "spirit" of science.

I agree that collaboration should be a goal of shared scientific resources, especially in America, because collaboration is seriously lacking. I see offering scientists use of equipment and resources that they usually would not have as an incentive to collaborate with other researchers and discourage isolated competition.

However, I think this is easier said than done. CAMCOR is an example of collaboration not being the primary mission, as it gives time and equipment use to those who have the grants and funding to pay for it. So, my strategy would have to remove any cost barriers, while at the same time forcing researchers to work together. But I also have to account for pseudo-collaboration where researchers would only collaborate in name.

My best idea at this time would be to have not a single shared facility or several shared facilities, but to spread equipment across regions of the US. What I mean would be to have an electron-microscope facility, an MRI facility...etc. This would be incredibly annoying and unreasonable for researchers, but it may force scientists to work together to lighten the load of travel costs, time ...etc. Again, this is pretty unreasonable, and the good old American individualism may find ways to press on, but it may be a first step.

Unfortunately the answer to this question is not black and white, as both collaboration and great facilities are important to improving and increasing scientific discoveries. However, it's important to not overvalue having as many facilities as possible, as without good oversight you can run into unnecessary research redundancies that waste both time and money. I know that a few years being a full researcher would give me a better perspective on this issue, and how scientists currently communicate with each other, but it seems that if there are incentives for scientists to work together on projects, and having close-proximity facilities share resources might offer some benefits to the scientific community and increase productivity/lower CONCURRENT research redundancies (of course, follow up experiments are good). For example, if two research groups are working together, perhaps they can get some sort of extra support for their facilities or project if they submit their grant proposal as a group, rather than 2 individual grant proposals (I know we talked about this in class, and how sometimes scientists hide the fact that they're working together to get more money, so maybe there's another way to incentivise admitting they're working together, like some extra time at a facility or something). Additionally I was thinking about what you said about the observatories on Kitt Peak, and how sometimes support staff cannot go and help another facility. I know this is complicated with different organizations paying different salaries, so perhaps each set of facilities can have support staff that serve each building so that problems can be solved faster.

I don't think it needs to be zero-sum. Cutting edge tools are absolutely necessary in some fields, but increasing access overall would be more beneficial. Choosing which fields require cutting edge tech would be a problem but I think prioritizing some funding for cutting edge tech while allocating the bulk of the funding toward increasing access (and improving collaboration) would be my initial starting point. At the federal level, I think giving researchers minimum funding that isn't contingent on productivity (e.g. number of papers/products/results) would help promote collaboration since now a researcher isn't incentivized to hoard their data. On the other hand, forcing open data as the "price of admission" to use the shared resource might be another way to ensure collaboration.

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inch vs national  
observatories -->  
unclear if it was  
"more" beneficial to  
build them**