Research: How is it funded?

Is there a market for our research? Can you go and buy a research result in the store around the corner? Well, there are items that obey different rules of selling and buying than, for example, food or cars. Take education: In Germany and some other European countries education is still mainly paid for by governments. Students are solely selected by their achievements in terms of grades, again from prior education stages, as “the air gets thinner the higher up you are”, meaning not everyone can get a college or university education, even if he/she would want to upfront the money. Different here in the US, not everybody, who would be capable of getting a university degree can afford to do so money-wise. Overall the verdict is not such a black and white story, as there are stipends, and even if education is paid for, fiscal necessities of life often prevent good students from pursuing such a career.

There is even a more complicated “market” for research. Companies that want to have an edge on the market by selling their product with the latest technology find themselves hunting for research results, either in their own labs or purchased from other labs, say at universities. This is purchasing research like a commodity, in this case to sell a better product, i.e. applied research. On the other hand scientists at universities and government labs might pursue a line of research purely for the intellectual interest and value. This is basic research. In reality there are all kinds of flavors in between. Why would a government (society) even be interested to fund basic research, as it doesn’t normally lead to new products, at least on the short run? 1) It is a defining part of our culture to pursue this in the framework of asking who we are and why we are here. 2) Since the model of a university as a place to combine higher education and research took off mostly in Germany in the 19th century, this combination is a hallmark of university education. 3) If you would restrict research solely to applied topics, you may run out of ideas quickly, as you are drawing from a general body of knowledge that would be replenished only very scarcely by concentrating on questions that are lying around.

The first government funded research program has been: Search for longitude! British commercial and military fleet to accurately find destinations around the globe. Main problem: exact time-keeping! Among others, this led to the discovery of the finite speed of light (Ole Römer). Finally solved by building a chronometer, very precise clock that would withstand the conditions on a ship with temperature and moisture variations.

Find Funding sources:
Use class webpage

How does research fit in at a university?
Infrastructure; synergistics of grant proposals; collaborations
Main agencies for UNH: (collect from students)
NSF; NASA, NOAA; DOE; DOD; EPA; … industry
These agencies do not fund just any potentially interesting idea! They are also not exactly directed by the government to pursue any specific research objectives (not generally). However, there are some guidelines that come with the field they cover and potentially trends in society and other factors. Generally, the scientific community is asked to define
the goals of the agencies or at least the goals of certain subsections of the agencies for the next few years, with outlook into a mid-range future. At the university level (here UNH) this goal-seeking is up to the Department, College, Institute, and driven by the individual and combined goals of their Faculty. In actuality this is an interplay between individual researchers, Department, College, Institute etc. goals as well as trends in the scientific community and related shifts of goals at funding agencies.

No matter whether you will later work in industry, at a government lab, or in an academic institution, you will be confronted with the need to propose for funds to develop a product, to enhance a product, to research a process, to enhance the research/development/production infrastructure and many more. In the course of responding to changing needs in our graduate program and to the haphazard nature of performance in qualifying exams, we plan to incorporate a thesis proposal and its defense to the steps for graduate students, while at the same time toning down the exam. In a way, the proposal is supposed to become an important learning experience by itself. As this may sound scary, let’s take a few little steps towards it here.

Let us work on a very brief proposal for each of our intended research goals. This does not have to be a far-reaching goal. It should be relatively simple. Let’s start with a field and then try to narrow it down. **Activity Q1 and 2**

Outline for research proposal:

A) The proposal aspect makes us a sales-person. How do we make a pitch that our planned research is important and interesting? What do you want to include in your proposal to show this? **Activity Q3**

Now that we have (hopefully) sold the necessity to do this research to reviewers and funding officials we need to explain how we want to achieve our goals.

B) What would funding agencies want to know, whether this can be done and whether it makes sense to fund the proposal? Normally you would not start from scratch. So there is prior knowledge, work done, ….. What needs to be included to make the step into the unknown palatable? **Activity Q4a**

You obviously can’t describe results of the yet to be done work, funding agencies and reviewing colleagues want to know, whether there is a good chance that you will be successful. What do you need to lay out in the proposal? **Activity Q4b**

The first step usually is a literature search -> next class. Start with general practices based on examples that Emily and I selected. Towards the end we will let you hunt for some sources that help you shape your question and provide background information. Include this task as response to Q5 and add a few more. **Activity Q5**

Go, talk to a professor in the department who can help you find a review or other introductory article for your question, and then bring the article to class on Feb 22.
**Introduction to Responsible Conduct in Research**

Recent examples of Misconduct: Victor Ninov, Hendrik Schön  
RCR in a changing world  
Ethics in Science: 2 issues  
- ethical behavior while pursuing science  
- ethics in the choices what to research and how to apply it  
Science doesn’t tell us anything about ethics, but scientists do make ethical choices.