Question for today

Our main question for today is: how might we assess the environmental impact of a system, especially when this particular thing seems so complex? In part because this touches so many stakeholders.

Federal environmental regulations

Remember when we talked about Encore? One of the structures in place that related to Encore was IRBs, which came from the Belmont report. We talked about how IRBs might need to be evolved/changed in order to deal with computer systems (and that's part of what the Menlo Report tries to do). Because the Menlo Report had an existing structure to reference — IRBs — you can imagine how its recommendations might be implemented in academia (e.g., you can imagine how a project within a university could undergo some sort of ethical review).

For the environment, we're going to start by looking for that type of structure in government regulations. One of the biggest environmental regulations is NEPA: National Environmental Policy Act, which went into effect in 1970 (*Slide 1*). NEPA applies to major projects that involve federal funding, work performed by the federal government, or permits issued by a federal agency. This doesn't cover every project in the world, but note that many projects that aren't obviously federally-funded do involve federal permits (for example, building an antenna or launching a rocket).

So what does this process look like? (*Slide 2*) Notice that the process flowchart has three columns. Those columns correspond roughly to:
1. The project won't impact the environment
2. The project might impact the environment, but we aren't sure, and so we do an Environmental Assessment (EA). If, after the EA, we believe that there will be environmental impacts, we move to step 3.
3. The project will impact the environment, in which case we do an Environmental Impact Statement (EIS)

In-class Activity

Have students find examples of Environmental Assessments and Environmental Impact Statements — even better if they can find one related to a project that they're familiar with! — note that they are substantial documents, and reflect on the following questions:

- What types of agencies are involved?
- How is the public involved, if at all?
- What sorts of laws come into play?
- How do the people involved with these documents make sure that they don't "miss" anything?
- Looking through these documents, what seems to work well? What could be problematic?

Potential Issues

We'll focus on two potential issues.

Issue 1: Time. It takes a long time to go through this process, and in some cases that is seen as a problem.

Example: The CHIPS Act: bring semiconductor manufacturing back to America, less reliance on other countries. Semiconductor manufacturing plants have the environmental impact that any large building would, but also leave behind a lot of chemicals (TCE). They can even leave behind superfund sites. In theory, any new manufacturing plant would have to go through NEPA review before being built; in fact, some sights have already submitted draft EAs (example)

In 2024, President Biden signed a bill to prevent that, citing concerns about how long the process takes (source; source). There has been pushback to this bill.

Discussion Questions

- Do you agree with the President's bill?
- How might we think about the trade-off between environmental protection and the time these assessments take to do?

Issue 2: Systems. NEPA regulations apply to specific projects, but there's not necessarily an EIS for an entire system. For example, imagine a cell company rolling out a new 5G network. NEPA would likely be invoked at various points (e.g., building antennas). But would there be an EIS to assess the impact of the entire system?

In-class Activity

3GPP is an example of an organization that might be well-placed to do some sort of overall system impact study of this hypothetical new communications network.

Take a look at the 3GPP website (https://www.3gpp.org/)

- What does this organization do?
- What is their role in enforcing the particular goals of 5G? For example, one goal is that it should use less power than 4G; how does 3GPP oversee that, if at all?

Discussion questions:

- What do you take away from this?
- What can we bring from NEPA back to our work as scientists and engineers?