As the final team assignment, you will develop an entirely new case study that we will use next spring in the second offering of iCons I. You will have an opportunity to see your work put to use through your participation as a mentor to the next cohort of iCons students. Several members of the student development team that worked on the cases we have used this semester have volunteered their time to help you in the process.

The development of a new case has several steps that help ensure a strong connection between fundamental **scientific principles** and a relevant **societal challenge** through which students exercise **critical skills** that are transferable to future work.

1. Identify a relevant **societal challenge** that has meaning to students and can be understood or solved in part through the application of scientific study. A good case study topic must have both. A scientific study unconnected to a global challenge lacks the impact we seek in this course, and a societal challenge that will play out entirely in the political arena lacks the scientific depth we also seek.

2. Identify several fundamental **scientific principles** that an investigative team must master to fully understand the scientific nature of the societal challenge. These must be fundamental in nature, cross-cutting in applicability, and possess a crucial relevance to any scientific solution to the societal challenge.

3. Choose one to three iCons I course objectives – **critical skills** – that students will exercise as they proceed through the case. Most cases deliver on more than one to three, but all have a small number that the activities and questions target. They provide a primary goal by which you will measure your success.

Only after working through the above will you be able to build the materials and activities that constitute the actual case study.

The *presentation* of an iCons case follows a progression:
Inception. Introduce topic, issues. Generate questions requiring scientific inquiry.
Engagement. Explore boundaries of personal understanding. Identify growth opportunities.
Research. Grow skills and knowledge based on opportunities and necessity.
Create. Use new skills and knowledge to build a scientifically meaningful and useful product.
Reflect. Analyze, critique, and evaluate the product. Recognize growth of transferable skills.

(over)

The *development* of an iCons case typically follows a very different progression, and we encourage you to approach your writing of these components in a similar, goal oriented fashion.

Create. What product will the students build at the end of the case? It should require them to use the fundamental scientific principles and exercise one or more of the critical skills to build a scientifically meaningful product. Some example products you have created this semester are proposals, critiques, explainers, simulations, presentations, and (currently) new scientific insight from a real dataset. What role will the team play in reaching these goals? The request for this product will be what you present at the Create stage of a case.

Research. What skills and/or knowledge will the students need in order to succeed in the Create activity? Think about the *very* broad diversity in backgrounds that an iCons class presents. What skills or knowledge can be developed through peer-to-peer learning (such as the principles you identified and communicated relevant to oil degradation processes)? What skills or knowledge can be acquired through independent reading or research? Are there pieces of knowledge or skills that will need to be presented to everyone (such as programming in Octave)? Will the capacity to succeed in the Create activity be *distributed*, requiring input from a multidisciplinary team, or *common*, where teamwork will accelerate a process? What activities will the students do to raise their knowledge base and skill level to the point where they will succeed in the Create activity? Those activities constitute what you will present at the Research stage of a case.

Inception. How will you introduce the societal challenge to the class? What media will you present (data, articles, movies, demonstrations, questions, etc.) that will inspire interest among the students and communicate the *impact* of any advance made in the area of the challenge and the *potential* for scientific inquiry to make such an advance. These materials and questions must communicate a real need that motivates the development of new scientific understanding, and will be presented at the beginning of a case.

Engagement. How will you moderate a discussion that connects the challenge to the principles and skills? *You* understand the connection between the societal challenge and the principles and the skills you identified, and you need to bring the class to that same level of awareness. What questions or discussion topics will probe the depth of the students' current understanding, and increase their awareness both of what is possible and where their own personal strengths and weaknesses lie? What small exercises or writing assignments will lead students to seek on their own the fundamental principles and critical skills that are the objective of the case? Engagement materials are presented to establish a need for personal and team growth in the face of the societal challenge.

Reflect. All aspects of an iCons case are student-driven, and the Reflection stage is exclusively so. At this stage, *you* should reflect on whether the materials and activities you have assembled for the case will be effective and valuable. Try them on some peers. Work through the activities. Imagine the discussions that students will have. When you are convinced that your case presents a *context* marbled with *content*, and teams of students will be able to recognize their own growth through participating in the case, it is ready for use and further refinement.