

Proposal for the Development of I-Earth as a Learning Helix

Rosemary Knight and Andrew Parsekian (Dept of Geophysics, School of Earth Sciences)

Contact Info: rknight@stanford.edu, phone: 736-1487

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GOALS

Introduction to I-Earth

In 2006, inspired by Introduction to the Humanities “I-HUM”, a group of faculty began to work on I-Earth, Introduction to Planet Earth. I-HUM offers a set of courses, under the I-HUM umbrella, to introduce students to “what it means to be human”. Our intent with I-Earth was to create a set of courses to introduce students to “what it means to live on planet Earth”. The broad objective was to motivate and prepare students to think about the complex nature of the connection between humans and the natural world. This was to be achieved by including in I-Earth a broad selection of courses that explored the intersection between human systems and natural systems, with any given course falling somewhere on the spectrum between a complete focus on human systems and a complete focus on natural systems. We envisioned I-Earth as including course offerings from faculty in the natural sciences, the social sciences, engineering and the humanities.

Our plan for I-Earth was not to have an I-Earth Gen Ed requirement, but rather to have courses under the I-Earth umbrella that could be taken by Stanford students to satisfy all of their Gen Ed requirements. As examples, the course by Ursula Heise and Mark Zoback on “Sustainability and Collapse” became an I-Earth I-HUM course; the course by Paul Ehrlich on Human Evolution and Environment became an I-Earth course that satisfied the Gen Ed natural science requirement. I-Earth began in 2006 by identifying existing Stanford courses that fit the goals of I-Earth. In total we had ~10 courses, that were promoted in flyers and ads in the Daily as I-Earth courses. It was very clear, however, that what was needed was the development of new courses, under the I-Earth umbrella, with a specific need for more courses in the social sciences, the humanities, and in the area defined in the Gen Ed requirements as “citizenship”. We therefore decide to “hit the pause button” two years ago, with the recognition that the SUES taskforce would provide a new framework for Gen Ed and thus new needs for I-Earth courses. With the completion of the SUES report, we are now ready to take on the work required to develop I-Earth. Moreover we are delighted to see that the concept of I-Earth is captured in the SUES report in the description of “helices of learning”. This proposal to Faculty College is to develop the I-Earth Helix.

Our specific proposal is to spend the next year developing a 3-year plan to launch the I-Earth helix, with a small-scale pilot version I-Earth available in fall 2013. Our planning will result in a report clearly identifying the learning goals of I-Earth, and listing specific courses that will be included. Some of these will be existing courses; others will need to be developed. Through our work in identifying and soliciting courses, we will experience first-hand the impediments to faculty involvement in general education, and will need to explore ways to deal with these impediments. Our final report will contain the 3-year plan for I-Earth. But much of what we encounter, and learn, will be transferrable to the development of other helices of learning and will provide information and insights of broader value to those at Stanford engaged in re-envisioning our undergraduate education.

Description of I-Earth Courses

As is said on the I-Earth website (iearth.stanford.edu) - What can be more essential to education, at the start of the 21st century, than knowledge of the planet on which we live? The subject matter that will be included in I-Earth courses will give students an understanding of the way in which Earth processes are essential to human life, and the way in which human activities can directly impact these natural processes. Stanford students should have this understanding of their planet, and the role they will need to play to ensure wise stewardship of Earth's resources. The "I", previously defined as Introduction (to Planet Earth) will be re-defined to be Interconnected (Planet Earth), with our courses covering many of topics shown in the "spider diagram" below, provide by Amos Nur. An essential feature of I-Earth, is that intellectually challenging subject matter will be delivered in such a way as to accessible to all Stanford students, not just those majoring in specific disciplines. We note that I-Earth courses will not (in most cases) be introductory courses, designed to be the *first* course a student will take in a discipline. Rather, they will be courses designed to be the *only* course a student will take in a discipline. I-Earth will be delivered from the perspectives of the scientists, the engineers, and the humanists at this university, thus embracing the new way of delivering our Gen Ed requirements through exposing students to the varied "ways of thinking" and "ways of doing".

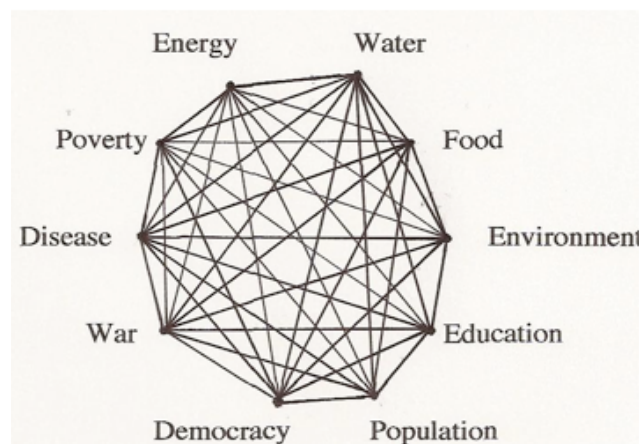


FIGURE: Interconnected Earth – an example of topics to be covered within I-Earth courses.

A key, broad objective of I-Earth is to reach a large portion of the undergraduate population. As a means of doing this, the I-Earth learning helix will be designed to provide students with a set of courses that could be used fulfill all of the distribution requirements, recommended by SUES, yet to be voted on by Senate. We intend for students who participate in the iEarth program to gain an environmental consciousness that will influence the way they think about the world they live in and convey an understanding for how science is interwoven into everyday life. A peripheral, but important goal is to give students that are already interested in environmental topics a framework within which to complete many distribution requirements - to "bridge the divide between majors and general education" as called for in the SUES report.

There are three specific goals related to the types of courses that will be offered under I-Earth:

1) I-Earth will identify existing courses and foster the development of new courses that engage students with advanced material at an introductory level.

The I-Earth helix is intended to provide students with essential knowledge about our planet that will enable them to think critically about their role in sustainability, the environment and prudent use of resources. It is currently possible for students to enter a course of study and become so absorbed in the details that they never develop an understanding and appreciation for the “big picture” of how the planet (including humans) works, the interconnectedness of the various elements, from resources, to pollution, to energy and water. This helix will specifically remedy that shortcoming by offering classes taught at a level that assumes no pre-requisites, but delivers advanced and engaging topics – specifically in contrast to “survey” courses that address the breadth of a field while often avoiding depth, or the introductory courses that serve as prerequisites to the more interesting subject matter.

2) I-Earth will utilize creative approaches to engage students in learning about the interconnectedness of people and their environment.

Innovative aspects of this program will be the use of crosscutting themes that span subject areas, interdisciplinary courses that bridge sciences and humanities and common resources that can be referred to in subsequent courses. An example might be a field site that would be utilized by a geology course to study the geological processes/properties in the area, then by an economics course that may investigate how humans extract value from the area and then a biology course that address what lives at the site and the human impact. An additional novel aspect of the I-Earth helix will be that it will encourage undergraduate research on interdisciplinary topics to involve the students in the creation of new knowledge. The design of the program seeks to move beyond transfer of facts from instructor to student and instead foster the underlying thinking behind identifying and answering research questions. This program will encourage students to engage in research topics that cross multiple fields – including those outside the student’s major.

3) I-Earth will achieve objectives set by SUES in the context of I-Earth topics.

A key motivation and justification for developing I-Earth is to implement a novel curriculum tool closely aligned with the objectives stated in the SUES report. In addition to the broad aim of creating a learning helix, it will be important to address focused learning objectives (LO’s) outlined as “ways of thinking and doing.” Given the potential to address a wide breadth of topics within the program, there is certainly room under the I-Earth umbrella to address each of the ways of thinking and doing headings, at least in part. Specific LO’s from the SUES report (or appropriately modified versions) will be included with newly developed courses. One approach for generating new ideas for cross-disciplinary teaching might be to select several specific LO’s from different categories to frame a course structure around. Appendix A lists all of the LO’s from the SUES report with the most relevant ones to I-Earth highlighted. Given the multidisciplinary nature of I-Earth topics and the opportunity for discussion and debate on the relevant science, policy and ethical issues in the field, I-Earth will be an ideal forum for students to develop excellent communication skills and critical thinking abilities.

Faculty College Involvement

While I-Earth has been moving along (at times along) for a number of years, Faculty College Involvement is essential to making this “real”, to making this happen, to energizing a group of faculty to come together to finally, truly, get this launched. Development of this program in the Faculty College framework will provide a structured environment and the resources that will inevitably improve the quality of the final product. We will be requesting assistance from CTL, essential as we clearly identify what it means to be an I-Earth course, and talk to faculty about the development of new courses. We are also requesting half-time support for a post-doctoral fellow (A. Parsekian), with research interests in geophysics and teaching interests in I-Earth. The required monthly meetings and quarterly work sessions will ensure steady progress and consistent participant involvement throughout the development process. Involvement in FC will also give us closer interaction with those within the Office of VPUE whose experience and insight would be of great assistance to the development of the I-Earth Helix.

Anticipated Audience

I-Earth is intended to be open to the entire undergraduate population. We anticipate that some students will take several courses and most will take at least one course in I-Earth. Courses will be designed for the freshman year to satisfy Thinking Matters and the writing requirements. R. Knight will be teaching an I-Earth TM course in Spring 2013; discussions are underway about an I-Earth PWR course. Other courses will be identified and/or developed to satisfy the distribution requirements; we anticipate that these courses will be at all levels (freshman- to senior-level).

As with students, I-Earth is intended to be open to the entire faculty population. Those who are most dedicated to the central mission of providing undergraduates with a fundamental understanding of human and Earth interactions will serve as the core group of Helix participants. This small group of faculty, along with teaching within I-Earth, will provide broad guidance to the I-Earth Helix and act as an Advisory Group. We expect that others will be involved with more discrete tasks such as teaching a course, or new course development. Faculty needs are likely to include time and resources for new course development, teaching assistants, pedagogy consultants and support materials for the new courses.

In addition to the importance of the subject matter to be brought to students through I-Earth, the *development* of I-Earth is in itself an important undertaking at Stanford, as we take on the work of implementing the recommendations of the SUES report. The SUES report specifically calls for the development of learning helices. The development of I-Earth can serve an example for future helices. As we design I-Earth, and prepare to launch this helix in 2013-14, we will address issues related to content, structure, resource needs, and will undoubtedly encounter unanticipated impediments. All of this will be transferrable to the development of other helices.

TEAM COMPOSITION

We will be using the retreat of the Woods Institute on April 12-14 to put together the team. The team will be composed of five faculty members, distributed across the schools, and Andrew Parsekian, postdoctoral fellow in Geophysics. To date, the following have committed to being on the I-Earth Faculty Leadership Team:

Rosemary Knight, Geophysics

Nicholas Jenkins, English, Faculty Director Program in Writing and Rhetoric

The faculty following have committed to being on the I-Earth Advisory Group:

Buzz Thompson, Law School

Julie Kennedy, Environmental Earth System Science, Haas Center

Ali Boehm, Engineering (possible for Leadership Team, undecided)

Carol Boggs, Humanities and Sciences

We plan to recruit undergraduate and graduate students to serve on this group. In addition, we plan to ask Robyn Dunbar to join, or recommend someone from CTL to join, our Leadership Team.

FACULTY COLLEGE PROJECT TIMELINE AND REPORTING PLAN

May 2012: Define participants in Leadership Team and Advisory Group

June 2012: Faculty College Leadership meeting

Summer 2012: Postdoctoral Fellow to lead discussion of branding and advertising. This will require that we clearly define the I-Earth Helix. Report to VPUE.

Fall 2012: Monthly meeting of Advisory Group. Develop I-Earth Helix-specific set of learning goals. Work closely with CTL to decide on the types and number of courses that we want in the I-Earth Helix. We want to ensure that we cover all of the distribution requirements, and also want to encourage innovative forms of teaching, including the design of courses that could be offered under a block system. Identify existing courses that should be included; identify needs for new courses; basis for report to VPUE.

Late Fall 2012: Invite faculty teaching existing courses to be part of I-Earth. Develop common set of slides to be used in the first 5 minutes of all classes in the first week in every I-Earth class.

Winter 2013: Meetings with faculty to encourage development of new courses. What are their needs? Work with VPUE to address needs. Monthly meetings with all faculty teaching in I-Earth followed by meeting of Advisory Group. By end of quarter have a plan for existing and new courses to be offered in 2013-14, 2014-15, 2014-15; basis for report to VPUE.

Spring 2013: Monthly meetings with all faculty teaching in I-Earth followed by meeting of Advisory Group. Final plan for I-Earth offerings for 2012-13. Design advertizing for I-Earth for 2012-13. Work with registrar and all others to develop an easy way to search for/find I-Earth courses. Ads in Daily to advertize I-Earth for 2013-14. Modify, as needed, the I-Earth Helix-specific set of learning goals. Modify, if needed, the common set of slides to be used in the first 5 minutes of all classes in the first week in every I-Earth class. Design course evaluation for I-Earth courses. Write final report for Faculty College.

IMPLEMENTATION PLAN

Year 2013-14 will be the pilot year for I-Earth. We will build I-Earth that year with existing courses that fall within the I-Earth Helix. This year will be used to focus the purpose of the Helix, generate student interest and lay a foundation that will enable long-lasting success. A key task during this phase of the project will be to layout a framework for introduction of the helix into the undergraduate experience. This includes determining needed resources essential for success. In class course evaluations will be conducted and assessed; modification of course offerings as required in response to course evaluations. Reporting will continue quarterly

through the first year of I-Earth implementation. By the time the new undergraduate curriculum is fully in place across the University, a management plan for I-Earth will be in place. Annual reports on new developments in I-Earth will be posted to the I-Earth website.

Appendix A: Learning Objectives

We recognize the importance of addressing intended learning objectives (LO's) within the coursework and broader structure of the I-Earth helix. This appendix lists all of the LO's stated in the SUES report (pp. 37 – 40) and items that could be particularly effectively addressed by I-Earth and related courses are underlined.

- **Aesthetic and interpretive inquiry**
 - develop skills for the study, analysis, and interpretation of expressive works and other meaningful cultural products.
 - demonstrate facility with close reading techniques, recognizing the key features of a text or artwork and understanding how these features contribute to its (intended) effect on an audience.
 - develop abilities to analyze interpretations, theories, and arguments, as well as broader frameworks for thought and action; to identify their assumptions; and to assess those assumptions rationally.
 - understand diverse artistic, literary, and theoretical traditions, their characteristic forms of production, and their development across historical time.
- **Social inquiry**
 - be able to apply the methods of research and inquiry from at least one social science discipline to the study of human experience.
 - what makes a question about human behavior empirically tractable and significant.
 - exhibit a capacity to think historically, recognizing the reciprocal relationship of social context and individual action and the reality of change over time.
 - possess the capacity to critically evaluate primary and secondary source materials, and to use both to fashion explanations for social and historical phenomena.
- **Scientific Analysis**
 - be able to understand and evaluate scientific concepts, theories, and evidence.
 - understand and utilize both inductive and deductive reasoning and understand the role of each in scientific inquiry.
 - be able to formulate hypotheses, to undertake careful and disciplined empirical observation, and to interpret experimental data.
 - exhibit a broad curiosity about the natural world, and about the ways in which knowledge about that world is obtained, analyzed, and interpreted.
- **Formal and quantitative reasoning**
 - hone formal and deductive reasoning skills through sustained engagement with problems in which the system of formal reasoning is itself the object of study.
 - be able to set and solve optimization problems (broadly construed), model complex processes, evaluate data, think probabilistically, and assess risk.
 - have the ability to distinguish between causal and correlational evidence, as well as the ability to recognize when the available evidence is too weak to decide a matter.
 - be comfortable not only with abstract principles of probability theory, statistics, decision theory, logic, and mathematics, but also with the application of empirical methods to concrete problems and questions.
 - Model complex processes or systems so as to be able to predict (or change) their outcomes.
 - recognize common mistakes that human beings make in empirical reasoning and problem solving.
- **Engaging difference**
 - attain an understanding of the histories, cultures, and social experience of diverse groups of people.
 - Grapple with the challenges that surface in interactions between people with diverse backgrounds and worldviews.
 - recognize the power relationships that structure interactions between people in different historical, social, and cultural contexts.
 - develop a rich appreciation for both human commonality and the diversity of human experience.
- **Moral and Ethical reasoning**
 - understand the nature of normative claims and recognize diverse normative concepts and arguments.

- Evaluate competing ethical and moral perspectives and claims.
- Possess a capacity to reason critically about ethical and moral questions, as well as an ability to make ethical and moral judgments about issues that they face in their lives.
- be broadly and continuously reflective about the ethical and moral dimensions of their own conduct.
- **Creative expression**
 - Explore their own potential to produce original creative projects, in whatever fields of endeavor they choose.
 - discover new capacities for self-expression.
 - learn to take creative risks, stepping outside of their comfort zones and accepting the possibility of failure.
 - experience design thinking, posing new questions, identifying obstacles (whether technical, social, or artistic), and devising creative solutions to them.