



PECE

Platform for Experimental and Collaborative Ethnography

Kim Fortun
fortuk@rpi.edu

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Project Statement

The Platform for Experimental, Collaborative Ethnography ([PECE](#)) is an open source (Drupal-based) digital platform that supports multi-sited, cross-scale ethnographic and historical research. The platform links researchers in new ways, enables new kinds of analyses and data visualization, and activates researchers' engagement with public problems and diverse audiences. PECE is at the center of a research project that explores how digital infrastructure can be designed to support collaborative hermeneutics.

PECE has been built and is governed by an interdisciplinary design group centered at Rensselaer Polytechnic Institute (Troy, New York, USA). PECE will be available for download and use by other research groups by December 2015.

While designed to support the particular needs of experimental ethnography projects, PECE provides a general model for the digital humanities, and particularly the empirical digital humanities (including work in history, anthropology, and other fields that collect and

The PECE Research Project

The aim of this project is to develop and experiment with digital infrastructure designed to support collaborative hermeneutics, particularly in the empirical humanities (including history, anthropology, folklore and other fields in which researchers collect primary data). The project has been carried out through development of the Platform for Experimental and Collaborative Ethnography to support an array of side-by-side test projects, including the founding project, The Asthma Files (a collaborative ethnographic project that examines different ways of understanding and addressing the health impacts of air pollution, in settings around the world). To orient the digital infrastructure development at its heart, the PECE project has also involved the following: critical analysis of existing digital infrastructure in the humanities; analyses that compare the empirical humanities to research in the natural sciences, seeking to understand similarities, differences, and how digital infrastructure can be shared and made interoperable; analyses of the philosophical implications of different content management systems (Plone and Drupal, for example), and different computational tools (linked data, for example); analysis of the work flows and assumptions of research in humanities-oriented ethnographic research; translation of poststructural understandings of language and knowledge into digital terms; identification of ways collaboration can be supported among empirical humanities researchers, and between empirical researchers, researchers in other fields, and people in diverse decision making domains; identification of the metadata, provenance, attribution and other functionality needed to provide the technical conditions for research collaboration and "open knowledge" in the empirical humanities; analysis of the broad research infrastructure (repositories, data nets, etc.) needed to support collaborative humanities research in coming decades.

An important early finding of the project is that digital infrastructures (of all types) harbor language ideologies and thus need to be designed in ways that acknowledge and expose this. Another finding is that poststructural understandings of language are at odds with the assumptions built into most digital infrastructure, yet could orient the development of digital infrastructure intentionally designed to support creative collaboration and innovation in and across diverse research fields. The PECE project can thus take digital infrastructure for the empirical humanities into its next phase, while providing general insight on ways digital infrastructure can support research collaboration and innovation.

analyze primary data, using hermeneutic techniques). PECE's "design logics" translate critical theoretical commitments (to perspectival multiplicity, for example) into digital terms.

PECE provides a place to archive and share primary data generated by empirical humanities scholars, facilitates analytic collaboration, and encourages experimentation with diverse modes of publication. The platform encourages humanities scholars to experiment with digitally-mediated, interdisciplinary collaboration, provides opportunities to involve students in humanities research as it progresses, and quickens the public availability of humanities research in an open access form. PECE also enables experimentation with new forms of peer review for humanities research, and functions as a portal to a suite of open source tools useful for humanities research, including tools developed in data science for other scientific communities.

PECE's design is both theoretically inflected and ethnographically grounded: platform design has been oriented by "design logics" drawn from cultural, social, and language theories, oriented by the constantly evolving needs of [The Asthma Files](#) (TAF), a collaborative ethnographic project focused on diverse ways people in settings around the world have experienced and responded to the global asthma epidemic and air pollution crisis. PECE's design group has now developed and tested multiple digital functions that enable ethnographic collaboration. In the next phase of the project, we will refine existing functions and develop others, through side-by-side development of diverse ethnographic projects on separate platforms.

Numerous instances of PECE (some only at the concept-stage) demonstrate its potential: [The Asthma Files](#) illustrates how PECE can support a collaborative research *project* (with shared questions linking project participants). The [Disaster-STIS Research Network](#) illustrates how PECE can support an international research *network*, in this instance connecting researchers around the world studying how disasters of different types, in different regions of the world, are anticipated and managed. We have also conceptualized instances of PECE for individual researchers (at different stages of their careers), and for different kinds of practitioners (people needing to manage chronic illness and associated documentation, encounters with diverse medical specialists, etc.).

Platform for Experimental, Collaborative Ethnography (PECE)

- * Is designed to be shared with other humanities and social science research groups once customized and stabilized, helping build out a rich ecology of interoperable digital projects, positioning humanities and social science scholars in the broad effort to leverage digital capabilities to support peer reviewed, open access scholarship.
- * Is built with Drupal, an open source content management system customized to deal with the complex, open-ended data characteristic of ethnographic projects.
- * Functions as a portal to a suite of open source tools useful for humanities research, including tools developed in data science for other scientific communities.
- * Provides a place to archive and share primary data generated by humanities scholars, particularly ethnographers.
- * Provides a space for and facilitates analytic collaboration among humanities scholars, and experimentation with diverse analytic models.
- * Provides an opportunity to experiment with new forms of peer review for humanities research.
- * Provides opportunities to develop and evaluate new, digitally-enabled genres and ways of expressing humanities research.
- * Enables humanities scholars to experiment with and better understand digitally-mediated collaboration and interdisciplinarity.
- * Provides opportunities to involve students in humanities research as it progresses.
- * Is designed to quicken the public availability of humanities research, in an open access form.

Development of PECE helps address the global challenge of creating research infrastructure to support deeply interdisciplinary and international research that addresses complex problems such as global environmental health, and disaster prevention, response and recovery. Such problems have dimensions that require the integration of data and analysis from the humanities, social and natural sciences, and engineering, and thus will require robust digital infrastructure for humanities researchers, designed to be interoperable with research infrastructure developed for other fields. To ensure such interoperability, we have worked closely with data scientists at Rensselaer, and within the Research Data Alliance (RDA), an international initiative to enhance capacity to archive, preserve, analyze, and share data within and across research communities.

BACKGROUND

The PECE project extends from work in cultural anthropology over the last few decades that foregrounds how cultural critique, innovation and change emerge, and the significance of the genre forms through which culture is expressed (Marcus and Fischer 1986; Clifford and Marcus 1986). This thread of work in cultural anthropology has drawn on literary and language theory to address the significance of genre forms both in everyday enactment of culture in different settings, and in scholarly representations of culture. PECE extends this thread of work into the digital domain through a platform design that reflects critical insight from theories of language, literature, and ethnography, built out organically with original ethnographic material. Thus, while designed to reflect critical theory, PECE is also ethnographically grounded, collaborative in nature, and expressly experimental: the platform is designed to permit change as called for by evolving ethnographic engagements. This entwined development process has been challenging but has proven robust, allowing us to identify needs and explore computational possibilities from *within* humanities work, learning about and building the kinds of tools that are critical when ethnographers work collaboratively, especially on complex topics involving multiple sites, scales and actors, and many different kinds of “data.”

We work on PECE aware of long-standing effort, often experimental in tenor, to integrate new technologies and media into the work and expression of cultural analysis. Gregory Bateson and Margaret Mead’s stunning work with photography – as both a research tool and means of conveying their analysis – comes immediately to mind (Bateson and Mead 1942; Jacknis 1988). The history of filmmaking in the conduct and expression of cultural analysis has also laid important ground, generating impressive methodological debates and innovation, and a body of work that literally provides different angles on matters of interest and concern to cultural analysts. Digital tools and modes of presentation add still other possibilities for getting at and sharing understanding of how “culture” works – in historical, geographic, political, economic and media context, always in need of deeper or alternative ways of understanding. The goal of PECE could be described as kaleidoscopic, enriching cultural analysis through use of an ever-evolving array of techniques and technologies – which, together, multiply perspective, give texture to insight, and animate reflexivity.

RATIONALE

The development of PECE has been motivated by an array of concerns that we have come to call “substantive logics.” Continual cultivation of growing list of substantive logics for the PECE Project itself, as well as for other instances of PECE, is a way to keep tuned to the historical and political conditions in which we work, integrating empirical and theoretical understanding.¹

- The contemporary -- globalized, high-tech, anthropogenic -- world generates complex risks and problems at an unprecedented pace -- calling for new levels of operational coordination within and across disciplines, and between researchers and practical decision-makers working at many scales (local to transnational). Researchers thus need to develop modes of work -- and supporting infrastructure -- that enable deep and complex collaborations of different kinds. PECE aspires to provide such infrastructure.
- Given the complexity -- scientific, technical, cultural, and so on -- of contemporary problems there is a special need to cultivate and sustain different ways of thinking about problems. As feminist theorists have long argued (Keller, Turkle), epistemological pluralism offers the best chance of understanding and figuring out ways to respond to complex problems. Care thus must be taken to keep collaborative practices from being over-determined; collaboration needs to produce and steward what the PECE project has termed “kaleidoscopic logic.”
- Preserving and extending the special perspectives of humanities researchers on contemporary problems poses particular challenges, partly because of technocratic habits of thinking in many practical decision-making domains. It is thus important to work to extend the practical relevance of humanities knowledge experimentally, drawing on deep (theoretical) insight into the ways meaning, knowledge, and culture “work.” Experimentation (and testing) is called for in the production, expression, and circulation of humanities knowledge, all of which are supported by PECE.
- Given the complexity of problems many empirical humanities researchers are concerned with as well as escalating constraints on research funding, humanities researchers need to develop infrastructure and governance for sharing research data. They also need to better “expose” (in the language of computer sciences) the many stages of humanities knowledge production --- so that there are possibilities for collaboration at all stages, and associated work can be attributed (thus crediting individual contributions in collaborative projects).
- Work at faultlines between different scales, cultures, and disciplinary communities reliably produces rupture and new lines of work (Traweek), partly because such interaction inevitably troubles established categories and modes of sense making, often producing double-binds (Bateson). The collaborative work supported by PECE thus promises to be vitalizing for the humanities writ large, and particularly the empirical humanities.
- Post-structural studies and theories of language have demonstrated how stabilized meaning is always partial, forced, and marginalizing (and thus often violent) (Derrida, Spivak, de Lauretis) -- pointing to a need and possibility for productively unstable knowledge

¹ Substantive logics for The Asthma Files, for example, include dramatically increasing incidence of

infrastructure and practice (Derrida, Spivak, de Lauretis). This is particularly the case in contexts of dramatic change, with enduring and emergent forms of injustice; in such contexts, established paradigms are insufficient for dealing with matters at hand. Poststructural insight thus has particularly relevance today, suggesting the way humanities insight can undergird contemporary efforts to support interdisciplinarity and innovation. PECE is designed to demonstrate this.

- Given the density of information flows today, laced with conflicts of interpretation and interests, practitioners in many domains need highly developed hermeneutic sensibilities, and a high capacity for collaboration – not only in carrying out concrete tasks, but also for thinking through what tasks should be carried out, how they should be prioritized, and how problem identification both directs practical work, and quickly makes alternative pathways invisible. PECE provides a space to experiment with and examine different forms of collaboration and thus can result in research findings with clear relevance to capacity building efforts in practitioner communities. As described below, we’ve also conceptualized an instance of PECE designed to serve practitioners themselves – patients dealing with chronic illnesses, for example, or community groups dealing with concerns about toxic chemical contamination.

AIMS AND QUESTIONS

PECE is at the center of a research effort to understand how digital infrastructure can be designed to support and sustain further development of the empirical humanities. Recognition of diversity within the humanities and even the empirical humanities is foundational to the project. The specific focus of the PECE project is on the challenges associated with poststructural, postcolonial and feminist theories of language, knowledge and politics. The PECE project works to delineate the work flows and practices that reflect scholarship in this vein, and ways digital infrastructure can support them. The PECE project also aspires to develop collaborative capacity among scholars, mobilizing poststructural understanding of the dynamics through which communication and knowledge are engendered.

The research questions that orient the PECE project include the following:

- What work flows, data types and analytic modes characterize experimental ethnography?
- What theories and assumptions about language, meaning, knowledge and sociality undergird experimental ethnography?
- What are the digital implications of the work flows, analytic modes and assumptions of experimental ethnography?
- How has experimental ethnography in different historical periods leveraged media technologies (photography, film, etc.), and what new possibilities are created by digital technologies?
- How do the digital implications of experimental ethnography align with conventional approaches to cyberinfrastructure development for research communities?

- How can experimental ethnography be extended (and possibly transformed) through new, digitally enabled modes of collaboration, analysis, and expression?
- How can experimental ethnography be configured so that its data and findings can be integrated with data and findings from other research fields (including the natural sciences, engineering and health)?
- What (conceptual, technical, etc.) advantages – and disadvantages – result from conceptualization of experimental ethnography data as “big data”?
- What digital structure and functions can support – and continually extend -- experimental ethnography’s signature mode of knowledge production?

TEST PROJECTS: ACTUAL AND IMAGINED

PECE for Collaborative Research Projects

Over the last five years, we have developed what has become PECE through development of [The Asthma Files](#), a collaborative ethnographic project designed to enhance scholarly understanding and public engagement with the kind of complex condition that the global asthma epidemic is an instance of. Staggering rates of asthma occur in very different settings around the world, exacerbated by an array of triggers, involving tangled natural, technical and social systems. Responding to asthma (and other complex conditions) requires extraordinary coordination of both intellectual and operational activities. Building PECE around our study of how people, communities and organizations have responded to asthma has thus been both methodologically challenging and promising. Through a focus on asthma, we have dealt with many different kinds of data (original recordings of interviews, found media, pharmaceutical advertising and educational material, historical documents, etc.) and have encountered real challenges in ethnographic collaboration: the need to share extremely heterogeneous primary material in a manner that makes sense to diverse researchers, the need for analytic annotation of material so that the archive doesn’t become a cache for everything; the need for genres of writing through which qualitative scholars can share their work as it progresses; the need to link a jeweler’s eye level analyses (in varied settings) to systems levels analyses; the need for ways of describing a complex scholarly project and its findings to diverse audiences, which can be articulated by researchers in different contexts and at different career stages. *The Asthma Files* project has involved senior researchers across the United States, PhD students, undergraduates and high school interns. A key aim (and success) of *The Asthma Files* has been to create structures within which students at all levels can be involved in the research collaboration. Another key aim (and very preliminary success thus far) is to create structures and forms of representation that will draw diverse users to ethnographic scholarship, through the PECE.

PECE for Research Networks

Another instance of PECE supports an international researcher network, the [Disaster-STs Research Network](#) , designed to connect researchers around the world studying how disasters of different types, in different regions of the world, are anticipated and managed.

STS and anthropological work in this vein goes back at least to the 1990s, when ethnographers studied high profile disasters in Bhopal and Chernobyl, as well as less visible disasters in remote areas of Papua New Guinea, Ecuador, etc. It was Hurricane Katrina, however, in a (U.S.) post-9/11 frame, which really prompted and accelerated engagement with disaster by interpretive scholars. Hurricane Katrina also prompted early digital innovations, resulting in numerous sites where narratives and material about Katrina could be archived, shared and reflected on. The challenge at this point is to develop interpretive disaster scholarship so that it is theoretically informed, more comparative, and more easily translatable into policy recommendations and public dialogue. Humanities studies of disaster are not only about past failures of technology and governance; they are a way to address a range of phenomena that characterize late industrialism: a need to govern ageing infrastructure, new high risk industrial activities and the varied impacts of climate change, including adverse weather and sea level rise; a need for new forms of science, engineering and other forms of expertise, amidst fiscal austerity programs; a need to respond to increasing frequency of coupled disasters, involving tangled technological, ecological, and social systems, demanding unprecedented coordination of intellectual and operational activities. The Disaster-STs Research Network, like the other projects to be supported by the PECE, thus involves emerging issues of urgent public concern, which call for new modes of scholarly engagement. Like the other PECE projects, the success of the Disaster-STs Research Network will depend on involvement of scholars from around the globe; in this case, many of the scholars work in the diverse disaster-research networks that have emerged in recent years in particular national settings and internationally, in response to particular forms of risk (from tsunamis and earthquakes, for example). The Disaster-STs PECE will need to provide a way to map these networks so that they are understandable to outsiders, to build on their accomplishments and to contribute to their further development.

Two other instances of PECE supporting research networks have only advanced through conceptual stages. “World Academia” would link researchers concerned with the way people in diverse academic settings have developed careers, commitments and ideas about the future of education, research and the university. The goal is to develop a historically attuned, cosmopolitan perspective on the contemporary university by building a body of materials through which we can think comparatively – across national contexts, about public and private institutions, and the impact of commercial interests, about the kind of education, research and university needed to address the complex conditions that characterize late industrial societies. This instance of the PECE has the potential to be a place to archive a vast number of ethnographic interviews already collected for other projects, which are now held in the private collections of researchers; this will depend on the development of robust protocols for obtaining consent to archive and share this interview material on a digital platform. This project also has particularly rich potential to connect researchers internationally, some in settings where universities and research are contracting; others in settings where there is rapid expansion and energetic effort to construct innovation-producing organizations and pedagogical programs. The

comparisons and dialogue generated through these connections would blur the line between basic and applied research, laying ground for the practical work needed to take scholarship and the university into its next historical phase through the development of a body of ethnographic material that draws out different visions and possibilities. Craig Calhoun, former director of the Social Science Research Council, among others, has called for this kind of work: encouraging research *on* contemporary research institutions, dynamics and perspectives to inform efforts to preserve and refresh education and research. As austerity measures lead to draconian cuts in budgets for research and education in many contexts, Calhoun notes that “Complaining won’t help this much. Using the tools of social science analysis to understand changes, choices, and possible futures may be more promising” (<http://www.ssrc.org/calhoun/2011/11/04/who-needs-knowledge/>).

The Fracking Files would support an international network of researchers and activists concerned about the recent shale gas boom. This project would create special needs for archiving found media in diverse formats; many households that have experienced the impact of near-by fracking operations have been able to produce incredible records with digital cameras; media activists with varying level of skill, also using diverse formats, have also helped document the impacts of fracking; these records need to be tagged, narratively framed and integrated with other records to build “the big picture.” Ethnographic interviews will also be important in this project. These interviews will explore how people became aware of possibilities for natural gas development, and how their perspectives on this opportunity has evolved over time. A key goal is to map the information flows as well as experiences that have shaped perceptions of fracking. PECE’s timeline function (described below) will enable this mapping; use of the PECE timeline to document household level change will be a new use, and can inform the way we refine the timeline and develop supporting functions.

PECE for Individuals

This instance of PECE would be customized to meet serve as basic infrastructure for individual researchers at different career stages. It would serve senior researchers looking for a way to organize personal collections of material, possibly to pass on to an institutional repository or their own university library. PECE would provide a way to organize the material -- such that the same material could contribute to different themes and groupings-by-media. A senior researcher could have different “groups” for field notes, recorded interviews, and so on, while also having “groups” for themes (religion, nationalism, etc.), field work at a given site, etc. In PECE, any particular artifact can be associated with multiple groups, so the researcher could demonstrate how they conceptualize and organize their material – thus making their collection all the more valuable. Additionally, all the material put into PECE would automatically have the metadata that would make it discoverable by other researchers (if the host researcher designates the material as open). This instance of PECE would thus allow senior researchers to become curators of their own collections – a value in itself – and would skirt the problem of back-log in many institutional repositories that often take the archives of senior researchers; we’ve been told that there can be a ten-year delay before a collection is even minimally organized once submitted to repositories (like the US National Anthropological Archive at the Smithsonian).

More junior researchers (whether just beginning or mid-career) could use PECE in a similar way – with the benefit of adding and tagging material as they collect it, in a manner compliant with best-practices in data management (thus fulfilling the expectations of funders like the US National Science Foundation).²

Whatever the career stage of a researcher using a personal instance of PECE, it could provide a valuable, very flexible architecture for organizing their material and work – which sets the stage for data re-use and other forms of collaboration from the outset.

PECE for Practitioners

We've also conceptualized instances of PECE that would serve different kinds of practitioners – providing not only an architecture for archiving material they are working with, but also analytic tools that enhance their hermeneutic capacity – helping them think through and interpret whatever material they are dealing with.

We have a fairly well elaborated conception of a PECE instance customized for patients dealing with extended (often chronic) health conditions, for example. PECE would enable archiving of pertinent physician-developed medical records paired with the functionality to annotate across records, healthcare system engagements, and disease experiences. PECE would thus help patients become curators of their own health history, providing analytic frameworks to qualitatively assess embodied experience, patient-physician engagements, treatment modalities, and so on. PECE could also provide analytic tools that help patients make sense of new information and decision-points in their care.

A PECE-for-Patients instance of PECE would allow patients to archive and think (hermeneutically) about many kinds of health information, including flows of data from the expanding array of patient center apps – which themselves do little more than provide quantitative tracking of symptoms, with the data produced often living in a completely separate space from the larger health record. Such an instance of PECE would respond to the way patients-as-users of information have been overlooked in work thus far to build a universal electronic medical records system. This is especially important in the case of chronic and difficult to manage diseases, which are on the rise worldwide; patients (and their caretakers) dealing with such diseases have a deep need for complex health and communicative literacy, which PECE can help facilitate.

We also have a very basic conceptualization of an instance of PECE customized to support communities and activists responding to concerns about toxic chemical contamination. Like patients dealing with extended illnesses, individual and groups dealing with toxics inevitably deal with huge amounts of documentation and conflicting interpretation, and need ways to keep up with and make sense of it all.

²This suggests a need to think about tagging historically: Can PECE capture different ways a researcher tags at different points in their career? If so, this could be yet another way PECE enables reflexivity.

PECE'S DESIGN LOGICS, LIGHT STRUCTURE, ARCHITECTURE, AND FUNCTIONALITY

PECE's Design Logics and Light Structures

The aim of the PECE research project is to develop and experiment with digital infrastructure that supports collaborative hermeneutics, recognizing that way digital infrastructure harbors assumptions about the ways language, meaning, communication and knowledge production work. The referential and essentialist “language ideology” that almost all digital infrastructure runs on, for example—in which terms have singular, stable identities that can be organized into rigid ontologies that allow for discovery by inductive and deductive operations— is odds with a hermeneutic understanding of interpretation, and the inevitability (and value) of conflicting interpretation. A referential language ideology also undercuts collaboration – suggesting that only one interpretation is needed and correct.

We have thus been explicit in striving to build PECE in a way that reflects poststructural theories of language, and postcolonial and feminist understanding of the politics of language. This approach acknowledges the ways power is laced into language, common sense and communicative practice, and calls for collaboration: if language is understood as an open system of disseminating meanings that are labile, ambivalent, dynamic, and transformative, continual re-interpretation, and layering of different interpretations is the way to robust knowledge.³

One PECE design logic is drawn from Derridean historian of biology Hans-Jörg Rheinberger's conception of how experimental systems work in the sciences, as a play between limits and openness, for example (Rheinberger 1998); another is drawn from James Clifford's' writing about how juxtaposition works in both surrealist art ethnography (Clifford 1981); yet another is drawn from Gregory Bateson's description of what happens when different scales or orders of communication collide, sometimes producing pathology, sometimes creativity (Bateson 2000 [1956]). See Appendix 2 for further articulation of PECE's design logics.

Our work and experimentation with design logics in PECE extends a vein of work in cultural anthropology concerned with the politics of representation and poetics, and with ways experiments in form can open access to new content and understanding (Marcus and Fischer 1986; Clifford and Marcus 1986; Fortun 2012). Our work with design logics for PECE also has significant implications for thinking in computer science, calling for nuance recognition of the ways ontologies, controlled vocabularies, and other structuring devices in digital infrastructure

³Anthropologist Michael Fischer's parsing of the difference between behaviorist, symbolist, structural and poststructural models of culture is useful here, and is embedded in one of our design logics, calling for digital functionality that enables engagement with “transmuting ambivalences of meaning.” See Appendix 2 below. Fischer explains that “Structuralist, and particularly poststructuralist, models decompose symbols and metaphors into chains of metonyms or association that play out into disseminating, ramifying, transmuting dynamics, attempting to model, in the structuralist case, the semantic-symbolic parameters of variation and transformation, and, in the poststructuralist case, the transmuting ambivalences of meaning that keep texts and communication labile (unless forcibly controlled, in which case poststructuralist deconstructive sensibilities highlight the tensions and processes of alternative meanings subversive to those intended and authorized by the controls)” (Fischer 2003).

control meaning, often undercutting both innovation and collaboration (Poirier, DiFranzo & Gloria, 2014).

Many of PECE's design logics are implemented as what we call "light structure" – structures that delimit without over determining the kind of knowledge production enabled by the platform. One type of light structure is what we call a "structured annotation" – a set of questions that allow researchers to come together in their thinking, without overdetermining direction or scope. See Appendix 3 for examples. Another type of light structure is enacted through we call "collaborative tagging" – which draws different uses of the "same" term into visibility through automated generation of a timeline that displays the differences. PECE's use of "light structure" reflects a key insight of poststructuralism -- that any structure, whether a database, a language, a philosophy, a science, a social order, must be light structure if it is to be productive, and open to growth and change.

PECE's design logics travel with the platform, keeping its theoretical assumptions visible, allowing theoretical ideas to animate without over determining PECE projects.

PECE's Architecture

PECE (and instances of PECE, such as The Asthma Files) includes an archive, space for online collaboration, and various forms for publication.

A PECE archive includes bibliographies, photographs, found documents, field notes, recorded interviews, and other material collected by ethnographers – with options to share in delimited or fully open ways, with metadata that provides contextual information and guidelines for attribution. The archive also provides access to varied observation and interview templates that can be used to produce artifacts. See Appendix 3 for examples. All materials original to The Asthma Files are licensed in the most open manner appropriate (given consent provided by interviewees, for example).

PECE also provides space where groups – large or small, private or public -- can collaborate, drawing on various, ever-evolving analytic structures developed to facilitate collaboration within a particular project. There are structures for annotating texts and interviews, for example, and structures for addressing shared questions that draw on arrays of empirical material. There are structures addressing questions central to a particular user's project (archiving in case relevant to other users in the future), and for addressing questions central to the larger collaborative project. Theoretical perspective is built into the questions. Timeline and photo essays formats can also be used for analysis in the PECE platform (or can themselves become publications). PECE's group architecture supports many differently focused projects within a larger project structure, facilitating collaboration, project integration, and the capacity to read and think across cases without undermining the individual project specificity that is so important to ethnographers, and to their larger, cumulative body of research.

PECE also encourages experimentation with a number of different genre forms for publishing in the empirical humanities. Timelines offer a temporally organized frame for images, video, and

extended texts, with hyperlinks. Photo essays work with images – photos, data visualizations, drawings, etc. – to draw readers through one topic, or bring multiple thematically related topics together. PECE’s “ethnographic file” is a collage of artifacts, analytic text, and images, with links to other files, to material in the project archive, and to other Internet resources. The PECE file is an experimental genre form designed to leverage digital capabilities in ethnographic writing, supporting non-linear, expansive, but deep engagement with a topic. PECE also supports established forms of writing in the empirical humanities (such as working papers and essays), and forms that can push humanities knowledge into various public spheres (press releases, legal affidavits). PECE files, timelines, and other publications become part of the project archive, and can be featured in online exhibits. All publications are open access, and designed to be reformulated in other genres (with attribution when material is shared among users).

PECE’s Functionality and Work Flow

Our work on PECE has prioritized development of functionality that extends PECE’s design logics and commitment to collaborative hermeneutics. A key challenge is to back up where collaboration between humanities researchers happens, providing opportunities for collaborative engagement long before final “publication.” Below we describe possible activities in PECE researchers’ workflow – moving back and forth across a project archive, (group) spaces for collaborative analysis, and publication:

- A PECE researcher can explore an ever-growing archive for a project, including publications stored in [Zotero](#), the open source/access bibliography tool developed by the Center for History and New Media at George Mason University. We are now working to synchronize tagging capabilities in Zotero and PECE, and to automate the transfer of content attached to a Zotero entry into a PECE repository. A PECE repository for a particular project includes a wide array of ethnographic material, including recorded interview, field notes, photographs (found and researcher created), found documents, and so on. These artefacts are tagged as a researcher deems appropriate. The different ways researchers use particular tags can be visualized in an automatically configured timeline; the purpose of the visualization is not to work toward standardization but to pull differences of interpretation into view and collective deliberation.
- PECE researchers can share their own data with a PECE archive, or borrow analytic tools available in PECE designed to orient data production. There are shared structures for observation, interviewing, spatial mapping tied to particular research questions, and so on. See Appendix 3 for examples. We are working to build functionality in PECE that allows the creator of these shared structures to be credited for their contribution.
- PECE researchers can also borrow structures for interpreting data. PECE projects have an array of “structured annotations” that can be used to interpret particular artefacts (a document or interview recording, for example), or to pull together an interpretation from many artefacts (of a particular city as an asthmatic space, for example). Many annotations, especially early in the work of a project, are of relevant published material, but any object can be annotated: an image, an interview or interview excerpt, a *Nature* article. The annotations are structured to ease sharing and comparing of “notes,” and to pull analysis back to a project’s “shared questions.” As a researcher writes an annotation, the entry window presents her with a series of these questions, to which all other project collaborators are also responding. A researcher may ignore some questions and write extensively on

others, but each response becomes an object in the PECE, and thus available in a structured way for recombination with other annotations on other materials. We are working to develop functionality that will allow researchers to see how other researchers have responded to a particular question in an structured annotation as they complete their own, and to pull together aggregations of question responses so that they can see the interpretations of many different researchers or of many different cases in one view.

- PECE researchers can also create and share analytic structures – that remain open to revision and elaboration by other researchers. We are working to develop functionality that will make all contributions visible and citable. These analytic structures can focus on different scales, guiding interpretation of an artefact, of a person or organization, or of a city or “nation.” See Appendix 3 for examples.
- PECE researchers can also “publish” their work in various forms, including timelines, photo essays, traditional working papers or essays, and the PECE “ethnographic file.” The PECE “ethnographic file” is an experiment in genre form intended to leverage digital capabilities in ethnographic expression. A PECE ethnographic file is a short but densely hyperlinked (“staccato”) description that addresses a project’s shared questions. The PECE ethnographic file is not an extended narrative that flows discursively like an essay (though the essay remains an important genre form for ethnographers). Instead, it is a combination or mash-up of multiple “objects” created through response to a project’s shared questions. These objects can be combined in different ways -- to portray something particular (the thought style of a US-based pediatric pulmonologist, for example, or of a South Indian Ayurvedic practitioner) or to relay comparisons (by pulling together an array of “objects” describing how causation is conceived by different kinds of people engaged with asthma).

RESEARCH FINDINGS AND CHALLENGES

Research through and for development of PECE thus far led to the following

- Analytic techniques in the empirical humanities differ from those in social science fields that may collect similar data, and are more akin to those used in literary and philosophical research, relying primarily on hermeneutics (interpretation for explanation and evocation rather than representative or statistical sampling for identification and validation). The goal is not to develop a concise and consistent view of an object, but to produce and explore multiple views of an object, leveraging “epistemological pluralism” (Keller 2002; Turkle and Papert 1990). Indeed, providing multiple, different interpretations and ways of representing particular phenomena (the sociocultural causes and impacts of the Fukushima nuclear disaster, or the impact of genetics research on understandings of environmental health, for example) is the key task for humanities researchers. Computational advances that support open-ended, underdetermined engagement with digital content that enables (even encourages) drift and transmutation in the way content is identified and taken up in analysis, are thus required.
- The goal of data sharing and re-use in the empirical humanities is far from straightforward given both the sensitivity of some data, and the importance of context for understanding the meaning of data. The PECE design group has thus worked to implement at-odds functionality -- for privacy and data protection, for meta-data that preserves critical

contextual elements, and to foster collaboration among remote research groups, project members, and non-academic collaborators.⁴

- There are many historical, political-economic and socio-cultural forces that work *against collaboration*, including established ways of thinking about and rewarding academic production, and conventional ways of thinking about the ends of analysis and research. Both these forces reflect the more general influence of positivist assumptions about knowledge, representation and communication.
- Digital infrastructures (of all types) harbor language ideologies and thus need to be designed in ways that acknowledge and expose this. Another finding is that poststructural understandings of language are at odds with the assumptions built into most digital infrastructure, yet could orient the development of digital infrastructure intentionally designed to support creative collaboration and innovations in and across diverse research fields. The PECE project can thus take digital infrastructure for the empirical humanities into its next phase, while providing general insight on ways digital infrastructure can support research collaboration and innovation.
- PECE can help advance the comprehensive internationalization of research called for by many US and international agencies (see <http://www.the-scientist.com//?articles.view/articleNo/35909/title/Opinion--Going-International/>).

GOVERNANCE

The PECE project is run by a design group with both permanent and rotating membership, led by Professors Mike and Kim Fortun at Rensselaer Polytechnic Institute, Troy, NY, USA. Lindsay Poirier is our Platform Architect, responsible for implementing PECE's design logics, drawing on analyses of other digital infrastructure developed for researchers (in the humanities as well as natural sciences). Dominic DiFranzo is Lead Computer Scientist, responsible for ensuring that PECE exhibits best data science practice (particularly with linked data functionality), while remaining tuned the special requirements of humanities researchers. Luis Felipe Murillo is Lead Open Knowledge Developer, responsible for keeping PECE tuned to evolving recommendations of open source and knowledge communities, and for building supporting data configuration and management into PECE. Alli Morgan is Lead Research Curator, responsible for integrating diverse researchers into various PECE projects, and for representing researcher needs to the PECE design group. The PECE design group also includes Brian Callahan and Brandon Costelloe-Kuehn, working most intensely with the Open Knowledge Design Sub-group.

⁴In this, PECE has adopted the Open Knowledge Foundation's definition of "open data" observing three general guidelines for design and implementation of PECE's data management policies: 1) data must be discoverable and index able through the web; 2) if the data is not machine-readable and distributed in an open format, it is not reusable; 3) open data must not have legal restrictions for its usage, repurposing, and redistribution. The goal is "open knowledge, defined "what open data becomes when it is useful, useable and used."

ROUTES TO COLLABORATION

The PECE design group welcomes feedback and maintains an open call for collaboration. Please contact Mike Fortun (fortum@rpi.edu) with feedback or to discuss deeper involvement.

At this point, we have identified the following development needs:

- We need to complete a Drupal module (already initiated) that will allow us to fully integrate the Zotero bibliography tool with PECE.
- We need to extend ways researchers can present their research, through capacity to build exhibits, for example -- such as those enabled by the [Omeka](#) platform.
- PECE is designed to support multi-sited, comparative ethnography. It thus makes space for similarly focused research in different geographic locations within the overall project structure. The site is designed to nest and relate projects; this is part of its digital innovation. To support this, we need to extend the capacity to customize file drawers within PECE focused on particular geographic locations. In *The Asthma Files* project, for example, we have learned that we need to be able to link to particular folders within the group Zotero for the larger project (so that users interested in a particular location aren't overwhelmed by the whole Zotero library), to link to region-specific news and newsfeeds, etc.
- PECE is designed to support ethnographic projects engaged with complex conditions – conditions that call for and stimulate the design of new means to create data about and visualize the condition. PECE needs to support easy sharing of these visualization tools so that they can be re-used in different locations. In *The Asthma Files* project, for example, we have both found and helped create design applications that help people visualize patterns of asthma and air pollution. Collaborators at the University of Houston (philosopher and informatics theorist/designer Dan Price, working with atmospheric chemist Barry Lefer), for example, developed a [tool for real time visualization of ozone in Houston](#) ⁵ This kind of visualization can be developed for any location where real-time ozone monitoring data is available. Most urban areas around the world have some kind of ozone monitoring capacity; the work of accessing and getting permission to re-use the data is a likely challenge – but one of ethnographic interest given the aim to understand how societies create and make use of data to deal with complex conditions. Development and sharing of visualization thus has research value, and practical value – and should be a robust PECE function.
- We need to develop a place on PECE where users can report problems, suggest new functions, and become involved in the building of new functionality. The [“get involved” page at Zotero](#) provides a starting example.

⁵ For more detail on the Houston visualization project, see <http://app1.kuhf.org/articles/1345123393-New-Online-Ozone-Map-Will-Help-Houston-Residents-Reduce-Lung-Exposure.html>. Another example: one of our interlocutors in Singapore, an asthma physician, is interested (and able) to develop a spirometer app for the iPhone that would play trumpet music while allowing people to test lung function on the move. The data could then be fed into both individual and collective maps showing how, when and where people breathe best, and worst. PECE should make it easy to share and implement this app and associated maps in different locations.

SUMMARY

The aim of this project is to develop and experiment with digital infrastructure designed to support collaborative hermeneutics. Development of the Platform for Experimental and Collaborative Ethnography (PECE) is at the heart of the project, supported by the development of an array of test projects, and by on-going analysis of research processes, infrastructural alternatives and the ways humanities knowledge can help direct technical development. The project will result in generalizable understanding of the philosophical assumptions and practical implications of digital research infrastructure. The project will also result in a open source digital humanities platform that can be shared with other humanities research groups once customized and stabilized.

The PECE platform provides a place to archive and share primary data generated by humanities scholars, particularly ethnographers, and provides a suite of tools for collaborative engagement among humanities scholars. The platform experiments with new forms of peer review for humanities research, and provides opportunities to involve students in humanities research as it progresses. The platform is also designed to quicken the public availability of humanities research, in an open access form.

In many ways, the Zotero bibliographic resource tool developed by the Center for History and New Media at George Mason is a model for PECE. We want to build a research tool sufficiently flexible to support a wide array of users, sustained by a group of developers working with open source processes and values. There is a critical difference, however. PECE is not theoretically neutral; it is designed to reflect key theoretical insights from poststructuralism, the work of Gregory Bateson and a wide body of ethnographic work.

PECE's **humanities significance** lies in its support for new kinds of collaboration among ethnographers, and between ethnographers and the array of stakeholders implicated in the issues ethnographers study. PECE allows for the nesting of many diverse projects within a larger shared project structure, facilitating collaboration and project integration without undermining the individual project specificity that is so important to ethnographers, and to their cumulative body of research. PECE also provides structures for involving students in ethnographic research at all stages, reconfigures and intensifies peer review, and connects ethnographic research to contemporary public problems. PECE continues a scholarly tradition in cultural anthropology informed by semiotics and other theories of language, encouraging critical and experimental engagement with "writing culture."

The **digital innovation** of PECE is a design that reflects both critical language theory and the concrete practice of evolving and experimental, collaborative ethnographic research. The platform supports the production and non-hierarchical organization of diverse content, contributed by geographically dispersed researchers, providing a repository of data that can be annotated, analyzed, and displayed in multiple ways. Computationally, PECE's design experiments with "light structure."

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APPENDICES

Appendix 1: PECE Design Group

Kim Fortun is a cultural anthropologist and Professor of Science & Technology Studies at RPI, with research focused on ways people understand and respond to environmental problems and disaster. Her 2001 book, *Advocacy After Bhopal: Environmentalism, Disaster, New Global Orders* (UChicago Press), was awarded the Sharon Stephens Prize by the American Ethnological Society. She is now completing a book manuscript titled *Late Industrialism: Making Environmental Sense*. From 2005-2010, Fortun co-edited the [Journal of Cultural Anthropology](#), and helped develop its first digital presence. Fortun has played a lead role in the development of [The Asthma Files](#), the [Platform for Experimental, Collaborative Ethnography](#), and the [Disaster-STIS-Network](#). She currently co-chairs the [Digital Practices in History and Ethnography Interest Group](#), in the [Research Data Alliance](#).

Mike Fortun is a historian and anthropologist of the life sciences, and associate professor in the Department of Science and Technology Studies at RPI. His research focuses on the contemporary science, culture, and political economy of genomics. Fortun co-authored *Muddling Through: Pursuing Science and Truths in the 21st Century* (Counterpoint, 1998) with physicist Herbert Bernstein. His second book is *Promising Genomics: Iceland and deCODE Genetics in a World of Speculation* (UCalifornia, 2008). Kim Fortun and Mike Fortun co-edited *Major Works in Cultural Anthropology, Vol 1-4: Moorings, Modernities, Emergence, Engagements* (Sage, 2009). From 2005-2010, Fortun co-edited the [Journal of Cultural Anthropology](#), laying ground for the journal's transition to open access in 2015. Fortun has played a lead role in the development of [The Asthma Files](#), and the [Platform for Experimental, Collaborative Ethnography](#). He currently co-chairs the [Digital Practices in History and Ethnography Interest Group](#), in the [Research Data Alliance](#).

Lindsay Poirier is a PhD student in Rensselaer's Department of Science and Technology Studies, where she builds from a background in web science in carrying out ethnographic research on the web science community, informed by feminist and postcolonial theoretical insight on the limits of representation and categorization (and thus computation). Poirier is also a member of Rensselaer's Web Science Research Center. Poirier is **PECE's Lead Architect**, responsible for implementing PECE's design logics.

Dominic DiFranzo recently completed a PhD in Rensselaer's Web Science Research Center, and will soon join the University of Southampton's web science research group. DiFranzo is **PECE's Lead Computer Scientist**, responsible for ensuring that PECE exhibits best data science practice (particularly with linked data functionality), while remaining tuned the special requirements of humanities researchers.

Luis Felipe R. Murillo recently completed a PhD in anthropology at the University of California-Los Angeles; his earlier education was in cultural anthropology and human sciences in Brazil (at UFRGS). His research focuses on digital technologies, and on social, cultural and discursive formations supporting collaboration. His dissertation focused on the development of Free and Open Source technologies and communities around the world. Currently, Murillo is a research fellow at the Berkman Center for Internet and Society at Harvard University. Murillo is **PECE's Lead Open Knowledge Developer**, responsible for keeping PECE tuned to evolving recommendations of open source and knowledge communities, and for building supporting data configuration and management into PECE.

[Alli Morgan](#) is an STS and pre-med student at Rensselaer. She has played a lead role coordinating research for both [The Asthma Files](#) and the [Disaster-STS-Network](#). Morgan has also led conceptualization of a new instance of [PECE](#), tentatively called “PECE-for-Patients.” Morgan is **PECE’s Lead Research Curator**, responsible for integrating diverse researchers into various PECE projects, and for representing researcher needs to the PECE design group.

[Brian Callahan](#) is a PhD student in Rensselaer’s Department of STS. Callahan has an undergraduate degree in anthropology and music performance from Carnegie Mellon, and a Masters in anthropology from Monmouth University. Prior to joining Rensselaer, he worked with the BSD (Berkeley Software Distribution) User Group in New York City, an open-source software project. He continues to work with BSD user groups around the world as part of his ongoing dissertation research.

[Brandon Costelloe-Kuehn](#) is a cultural anthropologist and lecturer in the Department of Science and Technology Studies at RPI. His research examines the design, logics and use of environmental media systems. For many years, Costelloe-Kuehn has been involved in the development of [The Asthma Files](#) and the [Platform for Experimental, Collaborative Ethnography](#). Since summer 2014, he served first as an intern and then as a Fellow of the [Research Data Alliance](#), rooted in RDA’s [Digital Practices in History and Ethnography Interest Group](#).

[Dan Price](#) is a philosopher specializing in the study of language, knowledge, and representation. Price played a leading role in the development of Clean Air Houston and has been deeply involved in the development of [The Asthma Files](#) and the [Platform for Experimental, Collaborative Ethnography](#) since their inception.

Appendix 2: PECE Design Logics

The Platform for Experimental, Collaborative Ethnography (PECE)

builds in *design logics* drawn from social, literary and aesthetic theory. These logics travel with the platform, keeping its theoretical assumptions visible, allowing theoretical ideas to animate without over-determining PECE projects. One PECE design logic is drawn from Derridean historian of biology Hans-Jörg Rheinberger's conception of how experimental systems work in the sciences, as a play between limits and openness, for example; another is drawn from James Clifford's writing about how juxtaposition works in both surrealist art ethnography; yet another is drawn from Gregory Bateson's description of what happens when different scales or orders of communication collide, sometimes producing pathology, sometimes creativity.

Alt-Ontology: This is the most abstract and elusive of our design logics, perhaps best glossed by the ancient and continuing conundrum of philosophies of Being (ontology at its most essential, transcendental, and reductionist) versus philosophies of becoming (that tend to be nominalist, particularist, and process-oriented). "Alt-Ontology" is a sign to mark how ontologies are more achievement than they are origin, and that they always contain an injection of alterity or "otherness" that renders them incapable of full closure, and always open to change. A formal, stable ontology and its controlled vocabulary and semantics are foundational to all digital platforms supporting knowledge representations and related projects across the natural sciences, social sciences, and humanities. The overall design of PECE relies, as it must, on such ontological devices but at the same time seeks in a variety of ways to keep their essential inconsistencies and strangeness visible and open to question. In the most global or general sense, PECE tries to render any "ontology," including its own, as a constantly open and difficult question that must also simultaneously be settled and operationalized.

Language Historicity and Pragmatics: PECE was designed with a distinct understanding of language: not as a transparent, self-evident medium, but a practice that is both underdetermined and over-determined by specific historical conditions of production and contexts of use. This understanding of language draws from different genealogies in the study of narratives and discourses, ranging from an understanding of the linguistic sign as a site that is fundamentally constituted by conflict and dispute of multiple perspectives (Mikhail Bakhtin, Valentin Voloshinov) to historical approaches of discourse as a performative and knowledge practice (Michel Foucault, Michel Pêcheux, Dominique Maingueneau, Norman Fairclough) and, more recently, to the anthropological study of language ideology exploring what counts as a language for determined social groups (Michael Silverstein, Paul Kroskrity). PECE allows for interpreting and understanding the ways in which history animates language by describing the conditions of possibility and the linkages between different language practices. Using collaborative tagging coupled with structured annotations, PECE allows for researchers to collaborate in their efforts to describe and foreground the multiple, heterogeneous, and contentious constitution of language in the context of a particular historical formation and across different institutions, communities, and knowledge practices.

Valuing Noise: An essential goal of digital infrastructure in the sciences is to separate signal from noise. Through a series of exclusions, extractions, and condensations, Big Data is refined into scientific knowledge. And the scope of most cyberinfrastructure, even that for cultural heritage projects, is always limited in advance: data on global textile trade, for example, has no place in a digital platform documenting and analyzing indigenous Andean weaving. Ethnographers have a long history of

fieldwork methodologies that insist they attend to more of the world than they think they are supposed to, that insist they collect more data on more people and things and their relationships than they think they need. PECE is designed to facilitate projects with ever expanding and evolving groups of collaborators, who contribute different data sets and different interpretive habits and goals. PECE allows for and encourages the continual addition of new types of data, representing new topics and domains, not previously defined as significant or pertinent. PECE is also designed to present a researcher, at various moments of the research process, with data or analyses from other researchers working in a different area. Someone researching the development of immunological theories of asthma, for example, might have their attention drawn to an interview with an atmospheric chemist who studies ozone levels in Houston. PECE leverages or augments the alterity already present in alt-ontology, in other words, always collecting more data than it knows what to do with, asking researchers to invent new analytics for this “noise” (signal’s future anterior).

Pursuing Differential Reproduction: Valuing “noise” and inventing new ways to make sense of it is, in some ways, only a re-iteration of how the natural sciences proceed. Biologist, philosopher, and historian of the life sciences Hans-Jörg Rheinberger understands the growth of scientific knowledge in terms of “experimental systems:” carefully defined structures that can reliably reproduce known phenomena and knowledge, but configured in such a way, or coupled to other less well-defined systems, that they can produce novel, unexpected results to be explored and elaborated, and in turn become part of a new reproductive apparatus. PECE is designed to support this experimental quest for “differential reproduction,” providing both content and structures that are both stable yet open to play and experimentation. A key example is our structured annotation module. Many digital humanities platforms allow for the annotation of text and other media, but almost always in an entirely unstructured way. PECE researchers can choose from a set of annotation modules that present each user with a “lightly structured” set of questions; they can respond to the question as they see fit, they can skip questions, or they can add new questions that become part of the structure that subsequent researchers can respond to. Multiple interpretations of the same artifact are collected in this way; moreover, each question and response within an annotation is made discoverable and available for later, higher-level analysis in comparison to other annotations made by other researchers. Thus, our set of “light structures” are a close synonym to Rheinberger’s “experimental system.”

Explanatory pluralism: in facilitating multiple interpretations of the same artifact, the PECE annotation module supports another design logic, the promotion of explanatory pluralism. Interpretive differences are a signature feature of most humanities research, as they are in the tradition of cultural anthropology in which PECE is situated. The expectation in the humanities is that different researchers will develop alternative understandings of the same object or event; the expectation in the natural sciences is that researchers will converge on a single, “best” perspective. In actual fact, however, such convergence either takes an inordinately long time, or is forced by reasons other than Reason. Feminist philosopher and theoretical biologist Evelyn Fox Keller has shown that the capacity to entertain and develop multiple theories for complex objects and phenomena has historically been crucial to the vital growth and development of the life sciences. Yet most digital infrastructure in the natural sciences has an implicit or explicit goal of conveying researchers as quickly as possible to a single possible answer. By design, PECE encourages the creation and assembling of multiple interpretations, hypotheses, and theories in the firm belief that such explorations of multiple possibilities is necessary for the kinds of complex conditions PECE researchers seek to understand.

Juxtapositional analytics: Identification, equation, integration, and synthesis are some of the primary modes of analysis in the natural and social sciences, and in cultural anthropology as well. Drawing on

the rich history of interactions between the surrealist movement in art and cultural anthropology in France, ethnographers began in the 1980s to experiment with alternative modes of analysis and presentation more oriented around difference, comparison, collage and juxtaposition. PECE's design structure seeks to leverage difference—different artifacts and data, different annotations from different researchers, different explanatory paradigms—into insight, through a variety of display mechanisms. New understandings of an event like the Fukushima disaster, for example, are generated not through its conformity with items in a Chernobyl data set, but by foregrounding through juxtaposition their differences on multiple registers, across scales. In terms used by philosopher Gilles Deleuze, PECE works through a logic of the “AND” (exemplified by Spinoza) rather than a logic of the “IS” (exemplified by Kant and Hegel).

Crossing Scales, Working Double Binds: In conversation with early cyberneticists and information theorists, the anthropologist Gregory Bateson came to deploy logical set theory as a means to understand the contradictions, paradoxes, and double binds that inhere in any complex system of communication and meaning. A dog's display of aggression, for example, becomes a form of play when it occurs in the context of appropriate “meta-signs;” statements of love among humans can produce pathologies when they occur alongside conflicting body language or other meta-language; scientific data *becomes* “data” only when it is supplemented with “metadata” of a higher order. Through the archiving and analysis of artifacts representing the multiple domains and scales of a complex condition like asthma or disaster—from the molecular to the global, the individual to the social, the physical to the biological to the cultural, the material to the discursive—PECE is designed to draw out the disjunctures that occur when passing from one scale or discursive domain to another.

Transmuting ambivalences of meaning: At every level, PECE seeks to instantiate a poststructuralist understandings of language. This may best be conveyed by a long quote by anthropologist Michael Fischer concerning shifts in how language, as a complex system of material signifiers, was understood over the course of the 20th century: “Behaviorist models take words and symbols to be unproblematic tokens, combined and rearranged in meaningful chains of sentences or utterances, done in turn-taking, stimulus-response sequences. Analysts can thus build up models of culture based on sets of belief statements made by actors. Symbolist models recognize that symbols are not univocal simple tokens but have fans of meanings, and that more is exchanged in any speech act than either speaker or receiver comprehends. Nonetheless, in symbolist models, symbols are still but more complex sign tokens – like overly full bouquets or pockets of fertile sediment – richly polysemic yet discrete. Indeed, the richest symbols are black holes: the entire culture is said to be condensed there. Symbolist analysts organize their models of culture around key symbols, symbol clusters, and nodes of semantic networks, somewhat like a crystal structure. There is a reassuring sense of relative stasis or stability of the symbolic system. Structuralist, and particularly poststructuralist, models decompose symbols and metaphors into chains of metonyms or association that play out into disseminating, ramifying, transmuting dynamics, attempting to model, in the structuralist case, the semantic-symbolic parameters of variation and transformation, and, in the poststructuralist case, the transmuting ambivalences of meaning that keep texts and communication labile (unless forcibly controlled, in which case poststructuralist deconstructive sensibilities highlight the tensions and processes of alternative meanings subversive to those intended and authorized by the controls).” Michael Fischer, *Emergent Forms of Life and the Anthropological Voice* (Durham, NC: Duke University Press, 2003).

Appendix 3: Structures for Observations, Interviewing and Interpretive Annotation

PECE / Interpretive Annotation: Reading Digital Infrastructure

The following set of questions were developed to enable collaborative evaluation of diverse digital platforms, aiming to understand how different digital platforms work, enacting particular language ideologies and assumptions about the dynamics of knowledge production and communication. This set of questions (operating as what PECE terms a “light structure”) was developed to enhance methodological capacity to make sense of digital infrastructure as textual and cultural as well as technical forms. What we learn from the comparative analysis guided by these questions can help orient further development of PECE.

In order to “annotate” a digital platform, a user would first create an artifact pointing to the digital platform to be evaluated. Then any user on the system could annotate the artifact by responding to these shared questions through an Edit interface on the PECE platform. New questions can be added at any time, by any users. Users of the shared questions are free to skip questions that they are uninterested in or unable to respond to. The PECE design group is developing a tool that will allow aggregation of responses so that different readings of diverse digital projects can be compared and visualized.

General

1. Who was the system built to serve, and why?
2. What functions does the system provide?
3. How are functions technically supported?
4. What other systems, platforms, or modules does the system rely on? Do other systems or platforms rely on it?

Data

1. What kinds of data do users enter?
2. How is the data stored (backend technologies, data formats)?
3. Where is data stored on the platform? In what structure is it stored? Describe the structure.
4. How is data organized?
5. How does data move through the system? What functions allow for data discovery?
6. How does the app translate user data into information?
7. What kinds of environmental, medical etc. information does the app pull in and provide users?
8. How does environmental, medical, etc. information contextualize/frame user data?
9. Are there public or private interfaces to collect data? (if so, what are the terms of use?)
10. Are the data available to the public? If so, what is the license? If not, who uses the data and for what purposes?

Use

1. How is the system actually used, and what accounts for divergence between intended and actual use?
2. What pathways are users directed to take through the system?
3. What other pathways through the system seem to have emerged?
4. What user data is collected on the system, and what opportunities are there for user feedback?
5. To what extent is the work done on the system visible or transparent? What processes appear to be hidden?
6. Are there protocols in place for managing the use of the systems, and if so, are they following industry standards or had internal groups defining policies?
7. How do users reference their use of the system? (by paying for it, by citing it as one would an academic paper?)

Support and sustainability

1. Who built the system, with what skills, and with what kinds of social or commercial commitments?
2. What is the business model?
3. What can we tell about the sustainability (and plans for) of this system?
4. Who responds to platform issues/breakdowns/bugs?

Ethnographic practice

1. What assumptions about ethnographic practice seem to be built in?
2. How does collaboration seem to be conceived and how is it implemented?
3. What assumptions about language and knowledge are built in?

DISASTER STS NETWORK / STRUCTURES FOR OBSERVATION

Charting Vulnerability

This research memo consists of a chart in which you will map the hazards potentially impacting your home community and region. Part of the exercise and challenge is to learn what information is and is not available. Search for information from government agencies at all scales, print and broadcast media, NGOs, etc. Knowledge you have from experience or talking to people can be referred to as “local knowledge.” Another part of the exercise is to think through the many different kinds of (potentially interlocking) risks that threaten a region. Risks associated with climate change should be on the list, along with risks associated with industrial operations, transportation, and political culture. See the example linked to on the course wiki. Please use a similar format. You can develop your chart offline, and then paste the chart into your wiki portfolio. I'll evaluate this assignment for the information you collect, and for the creativity you demonstrate in finding information sources.

Disaster Analysis

For this research memo, you'll analyze a particular disaster – fast (like the Fukushima disaster) or slow (like contamination of ground water). Once you select a disaster, please add it to the list on the wiki so that each of you focuses differently. Answer the questions below, indicating where you got the information. Embed or provide a link to an image for each response, making sure to provide citations for these, too. Be creative in your collection of images: you can provide photos, graphs, a snapshot of a newspaper headline – anything that will help your reader visualize what you are describing.

1. What disaster are you analyzing, when and where did it occur?
2. What injury and destruction was produced by this disaster?
3. Who were (and likely continue to be) stakeholders in this disaster?
4. What systems failed in this disaster? (technological, business, organizational, regulatory, educational, atmospheric, cultural, etc.)
5. How did disaster recovery unfold?
6. What kinds of expertise were implicated in this disaster?
7. How has this disaster been covered by media or other educational ventures?
8. What are the practical lessons of this disaster?
9. What does your analysis suggest about potential roles for STS disaster research going forward?

(Disaster) Organization Analysis

For this research memo, you will analyze an organization that plays some role in disaster risk reduction and response. Once you select an organization, please add it to the list on the wiki so that each of you focuses differently. Try to answer all questions below, providing supporting links and other references. I realize some of the questions may not be answerable without research beyond the scope of what can be done in our time frame.

1. When was the organization founded, what was the founding purpose, what were its modes of support, what was its early structure?
2. What was the political and discursive context in which the organization was founded, and how did this context motivate and shape formation of the organization?
3. What events (internal and external) have had a significant impact on the evolution of the organization?
4. What is the mission of the organization today, and how do actors within the organization explain the importance of this mission? What discourse formations compete for authority within the organization, and which formations appear to be dominant?
5. How is the organization supported financially?
6. What is the structure of the organization today, and what kinds of people work within it? What strategies and programs have been developed to support the organization's mission?
7. What organizational ecology or sector does the organization function within, and what is its place within this ecology?
8. What kind of data does the organization produce and share, and what kinds of technology and infrastructure support this? How does the organization evaluate and monitor the credibility of the information it uses and circulates?
9. What political and discursive currents most forcefully affect the organization today? How do actors within the organization perceive these currents?
10. How is the organization perceived externally, and how does the organization strategize its reputation?
11. What does your analysis suggest about potential roles for STS disaster research going forward?

Projecting Mitigation and Recovery

This research memo will include description of two programs – one focused on disaster mitigation and the second focused on disaster recovery – that you find compelling, for either positive or negative reasons. For each, the following questions should be addressed:

1. What program have you selected, where has it been implemented, and what are the goals?
2. What organizations have been involved in the development and delivery of the program, and what in their background has shaped their effort?
3. In what (socio-cultural, political-economic, infrastructural and ecological) contexts have the programs been operationalized, and how has context shaped program development?
4. What is your evaluation of the goals of the program, and of the way the goals have been met?
5. What does your analysis suggest about potential roles for STS researchers in disaster mitigation and recovery going forward?

Building Disaster STS

This memo consists of a series of entries addressing four meta-level questions about Disaster STS: Why is it important to cultivate STS disaster research at this historical juncture? What does STS bring to disaster research? How can disaster research advance theory, methods and the empirical record in STS? How should STS disaster research be shaped and strategized going forward?

THE FRACKING FILES / STRUCTURES FOR INTERPRETIVE ANNOTATION

Structure for annotating an article or interview

1. Full citation.
2. Where did/does the author/s work, what else has s/he written about, and what are her/his credentials?
3. What are the topics of the text?
4. What are the main arguments of the text?
5. Describe at least three ways that the argument is supported.
6. What three (or more) quotes capture the message of the text?
7. What does the article or report tell us about (the project's shared questions):
 - a) the conditions and perceptions that make people vulnerable in the context of shale gas development.
 - b) the vulnerabilities and injuries produced by shale gas development.
 - c) the structures or factors that create -- or undermine -- recovery and resilience in the context of shale gas development.
 - d) the matrix of sites and people that shale gas development connects and depends on.
8. What three points, details or references from the text did you follow up on to advance your understanding of shale gas development?

Structure for analyzing an organization

1. What is the name, website and address of the organization?
 2. When was the organization formed, and what is its stated mission?
 3. Does the mission of the organization seem to have evolved over time?
 4. What initiatives related to shale gas development has this organization undertaken?
 5. What assumptions and arguments about shale gas development seem to be embedded in their initiatives?
 6. What have been the successes and failures of this organization overall, and of particular initiatives?
 7. Where has this organization been commented on -- in newspapers, blog, conference panels, etc.?
 8. What can we learn from this organization's work about (the project's shared questions):
 - a) the conditions and perceptions that make people vulnerable in the context of shale gas development.
 - b) the vulnerabilities and injuries produced by shale gas development.
 - c) the structures or factors that create -- or undermine -- recovery and resilience in the context of shale gas development.
 - d) the matrix of sites and people that shale gas development connects and depends on.
 9. What did you follow up on to advance your understanding of how this organization has been a player in shale gas development?
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THE ASTHMA FILES / **STRUCTURES FOR OBSERVATION, INTERVIEWING, INTERPRETATION**

Interpreting Asthma Knowledges

1. What person, group or organization is being profiled, and why are they of interest to The Asthma Files?
2. What have they done – through research, or a particular way of documenting or caring for asthma, for example-- that illustrates how they conceive of the causes, triggers and management of asthma?
3. What timeline of events illustrates how this way of thinking about asthma has developed?
4. What causes, mechanisms, triggers and dynamics of asthma are identified or presumed by this way of thinking about asthma?
5. Does this person, group or organization claim to have a new or unique way of thinking about asthma? Does this approach point to or suggest problems with other approaches?
6. What studies have they done to further their understanding of asthma? How were their studies designed?
7. What data (including experiential data) was collected or used to support or explore their way of thinking about asthma? What visualizations of this data have been created?
8. What relationships and types of causation are drawn out in this way of thinking about asthma?
9. What kinds of technology and infrastructure enabled this ways of producing asthma knowledge?
10. What kinds of social collectivity have shaped or enabled this way of thinking about asthma?
11. How does this person, group or organization make use of data and findings generated by others – in other scientific disciplines, in other municipal or national contexts, etc.?
12. Has this person, group or organization devised ways of testing their asthma knowledge, or ways to pursue new asthma knowledge?
13. How can the thought style of this person, group or organization be described?

Characterizing Asthmatic Spaces

1. What are signature characteristics of this area as an asthmatic space?
2. What are notable air pollution governance characteristics of this area?
3. Is there a record of environmental injustice? Is the area thought of as an asthma hotspot? Who are the stakeholders?
4. What spatial units (cities, counties, provinces, regulatory regions, etc.) are important in this area?
5. What examples illustrate the dynamics of environmental health governance in this space?
6. What other examples of governance in this space point to a signature governance style?
7. How prevalent is asthma, and who is tracking asthma prevalence?
8. What are the costs of asthma to families affected by asthma, to government, to businesses (in lost work days, for example)? Who is producing this information?
9. How has asthma been covered by local media? Where have causes of and responsibility for asthma incidence been placed? What interventions have been highlighted?
10. What kinds of civic organizations (environmental groups, caregivers groups) are involved in asthma surveillance and care?

11. What kind of research has been done on environmental health issues in this area, and what are the findings?
12. How have global concerns about environmental equity and health disparities shaped local research, and the use of research in governance?
13. How has science relevant to environmental public health moved into law and policy?
14. What has shaped scientific practices and culture in this space? Have scientific practices and culture shifted in recent decades?
15. What hierarchies have emerged between different research communities and the modes of evidence they produce, what accounts for these hierarchies, and how does it impact the use of science in governance?
16. What cultural, social, political, economic, ecological and built features of the area may contribute to asthma patterns?
17. Are there notable occupational drivers of asthma in this area?
18. What is known about air quality and dynamics?
19. What information is available to assess cumulative community risk?
20. How do different people in this area experience asthma?
21. How have people integrated experiential knowledge with other kinds of knowledge?
22. What forms of medical care are available (and not) to people suffering from asthma?
23. What forms of asthma education (in schools, for example) exist, and what is their orientation?
24. Who regulates environmental triggers of asthma, and what is their record and reputation?
25. What programs are in place to measure and mitigate asthma triggers in this area?
26. How have asthma rates in this area changed since 1985? Since 1945?
27. Are there new treatments for asthma? How, over the last decades, has medical care for asthma changed? Have traditional medical practices been overtaken by modernized practices?
28. Have government agencies changed the way they conceive and respond to asthma?
29. Are there new civic organizations working on asthma?
30. Has concern about climate change shaped the way asthma is understood and addressed?
31. What kinds of policies and enforcement could change asthma incidence?
32. What would improve asthma care and education, and how could this build on existing infrastructure?
33. How could The Asthma Files project help mobilize positive change in this area?

INTERPRETING FORMS OF ASTHMA CARE

1. What person, group or organization is being profiled, and why are they of interest to The Asthma Files?
2. What have they done – through research, or a public health program or education forum, for example-- that illustrates how they have worked to improve environmental public health?
3. What timeline of events illustrates how this way of addressing environmental public health has developed?
4. Does this person, group or organization claim to have a new or unique way of addressing environmental public health? Does this approach point to or suggest problems with other approaches?
5. What data have they collected or used to support their approach to environmental public health? What visualizations of this data have been created?
6. What kinds of technology and infrastructure do they rely on in the production of environmental health care?
7. What social ecology does this person, group or organization work within, and how did it shaped their way of conceiving and engaging asthma?

8. What events or data seem to have motivated their ways of thinking about and engaging asthma?
9. What funding enables their work and possibly shapes their way of thinking about asthma?
10. What in the history of this person, group or organization likely shaped the way they conceived or and engage asthma?
11. What does this person, group or organization seem to find methodologically challenging or concerning in dealing with asthma?
12. What kinds of governance are (implicitly or explicitly) called for in the way they think about asthma?
13. How can The Asthma Files enable or supplement this way of thinking about asthma, and the work of this person, group or organization?

Basic Artifact Annotation

1. What artefact is being annotated, and who created it?
2. Why was the artefact added to the TAF archive?
3. What three quotes capture the critical import of the artefact?
4. What is the main argument?
5. Describe at least three ways that the main argument is supported.
6. Describe the main literatures or traditions of work that the artefact draws on and contributes to.
7. Describe practical initiatives described or called for by the artefact.
8. Explain how the argument and evidence of the artefact can contribute to TAF's overarching research questions (about asthmatic spaces, knowledge, care and governance)?
9. List details or arguments that will help advance your particular thread of work in TAF.
10. Describe what the artefact prompts you to follow up on.

Analyzing Asthma Technologies

1. What technology is the focus of this analysis, what functionality does it have, and what problem does it address?
2. What organizational setting and dynamic was the technology developed in, and who was involved in its development? What kind of expertise did participants bring to the project? What participants were notably absent in the design and development of the project?
3. What motivated design and development of the technology, and how do project designers and developers articulate its "design logic"?
4. How has the project been funded, and how has this shaped the project?
5. What stakeholders have been enrolled in project development? What stakeholders have been ignored?
6. How has involvement with development of the technology e/affected project participants?
7. What was the technology originally designed to accomplish, and how has the design evolved over time?
8. What is the development history of the technology? What previous technologies were used by those involved?
9. What data is produced by or associated with the technology, and how has this implicated its development?
10. Is the data produced available to the public? If so, what is the license attributed to it? Is there an API available for users and developers? If so, is it documented? What are the skills necessary to make use of the data?
11. How has the organizational context and express purpose of the technology evolved over time?
12. What significant setbacks have impacted development of the technology?

13. How has the technology been used, and what do users say about the technology? Who has had access to and used the technology?
14. What will create the most significant barriers to further development and dissemination of this technology?
15. What broad social, political, economic and cultural trends have and will likely continue to affect the development, use and impact of the technology?
16. Who is implicated or dependent on the use of the technology?
17. What is the current reach of the technology, and is it scalable in the future? Is there a sustainability plan?
18. How has the technology been received by various stakeholders?
19. How are tasks defined and distributed within the project? Who gets to define and assign tasks? Are there distinct roles and attributions related to the tasks? If so, what are they?
20. What, from your (the analyst's) perspective, are the "design logics" and implications of the project? In other words: what kind of knowledge, care and governance does the technology engender, and undercut?
21. Has this technology produced data that contributed to environmental health knowledge and governance?
22. What additional questions should be asked about this (and other) technologies implicated in environmental health knowledge and governance?

Observing Technology Users

1. What technology is being observed?
2. Who uses the technology, and how did they access it? What costs are associated with use?
3. What do users do with the technology, with what frequency and in what kinds of instances and spaces?
4. What motivates use of the technology by different kinds of users? What promotes confidence in the technology?
5. What are the effects of use of the technology by different users? Does the technology change user behaviour or perceptions? What kinds of social or political interactions result from use of the technology?
6. What adaptations have users made to the technology, and why?
7. Are there users who are actively experimenting with the technology to push its development and possible application?
8. Who and how is use of the technology being tracked and evaluated?
9. What is your (the analyst's) evaluation of the technology? What is your reading of the design logics of the technology? What is your reading of the design effects of the technology?
10. Additional questions that should be asked about technology users?

Interviewing about Environmental Health Governance

This interview protocol was developed to support a sub-project of The Asthma Files focused on responses to the health effects of transportation related air pollution in six cities (Beijing, Bengalura, New York City, Philadelphia, Houston, Albany). In each city studied, project researchers will examine the operation and use of science in four arenas of governance (environment, health, transportation and education), and how these different arenas interrelate. They will map the sources of scientific evidence used in governance, how these sources are evaluated, and translated into policy and programming. They will also document and analyze the scientific infrastructures that produced the findings used in governance, the diversity of stakeholders involved in interpreting scientific findings, and diverse cultural logics that shape the creation and use of scientific knowledge in different settings.

1. Can you please describe your professional position? What geographic region is of professional concern to you, and what are your professional responsibilities?
2. Who are the key stakeholders and actors in environmental health governance in your region, and what can you share about their positions and strategies?

3. What environmental health data has been collected in your region, by whom, and for what purpose?
4. What environmental health controversies have received attention in your region in the last decade or so? Are you aware of environmental health concerns that haven't received much attention? What government agencies and laws regulate environmental health stressors in your region? What is your perspective on their efficacy?
5. What have you observed or experienced that illustrates the way science has been developed and used in environmental health governance in your region? Have particular kinds of science or evidence been more influential than others?
6. What have you observed or experienced that illustrates the way different agencies and scales of government work together (or fail to work together) in your region? [We are particularly interested in interaction between agencies responsible for health, environment, transportation and education, and in interaction between municipal, state, national and international institutions.]
7. What have you observed or experienced that illustrates the (possibly distinctive) political culture or dynamics of your region?
8. How have concerns about environmental equity and health disparities been addressed in your region, and to what effect?
9. How has information about environmental health science and policy circulated in your region, and who has provided the information (print media, NGO newsletters or websites, health professionals, etc.)
10. Do you follow research or news coverage about environmental health science and governance in other regions? If so, what have you found particularly notable – particularly in providing new insight into your own region?
11. What do you think needs to be done -- through research, law, development of capacity in government agencies and health care, etc. – to support future improvements in environmental health in your area?