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COVER SHEET FOR PROPOSAL TO THE NATIONAL SCIENCE FOUNDATION

PROGRAM ANNOUNCEMENT/SOLICITATION NO./DUE DATE NSF 16-595		<input type="checkbox"/> Special Exception to Deadline Date Policy		FOR NSF USE ONLY	
FOR CONSIDERATION BY NSF ORGANIZATION UNIT(S) (Indicate the most specific unit known, i.e. program, division, etc.) OPP - ARCTIC SYSTEM SCIENCE PROGRAM		NSF PROPOSAL NUMBER			
DATE RECEIVED	NUMBER OF COPIES	DIVISION ASSIGNED	FUND CODE	DUNS# (Data Universal Numbering System) 050299031	FILE LOCATION
EMPLOYER IDENTIFICATION NUMBER (EIN) OR TAXPAYER IDENTIFICATION NUMBER (TIN) 741109620		SHOW PREVIOUS AWARD NO. IF THIS IS <input type="checkbox"/> A RENEWAL <input type="checkbox"/> AN ACCOMPLISHMENT-BASED RENEWAL		IS THIS PROPOSAL BEING SUBMITTED TO ANOTHER FEDERAL AGENCY? YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> IF YES, LIST ACRONYM(S)	
NAME OF ORGANIZATION TO WHICH AWARD SHOULD BE MADE William Marsh Rice University		ADDRESS OF AWARDEE ORGANIZATION, INCLUDING 9 DIGIT ZIP CODE William Marsh Rice University 6100 MAIN ST Houston, TX. 770051827			
AWARDEE ORGANIZATION CODE (IF KNOWN) 0036046000					
NAME OF PRIMARY PLACE OF PERF William Marsh Rice University		ADDRESS OF PRIMARY PLACE OF PERF, INCLUDING 9 DIGIT ZIP CODE William Marsh Rice University TX ,770051827 ,US.			
IS AWARDEE ORGANIZATION (Check All That Apply)		<input type="checkbox"/> SMALL BUSINESS <input type="checkbox"/> FOR-PROFIT ORGANIZATION		<input type="checkbox"/> MINORITY BUSINESS <input type="checkbox"/> WOMAN-OWNED BUSINESS	
				<input type="checkbox"/> IF THIS IS A PRELIMINARY PROPOSAL THEN CHECK HERE	
TITLE OF PROPOSED PROJECT Convergence NNA: PanArcticon Research Program for an Interconnected Global Arctic					
REQUESTED AMOUNT \$ 510,096	PROPOSED DURATION (1-60 MONTHS) 60 months	REQUESTED STARTING DATE 01/01/18	SHOW RELATED PRELIMINARY PROPOSAL NO. IF APPLICABLE		
THIS PROPOSAL INCLUDES ANY OF THE ITEMS LISTED BELOW					
<input type="checkbox"/> BEGINNING INVESTIGATOR		<input checked="" type="checkbox"/> HUMAN SUBJECTS Human Subjects Assurance Number _____			
<input type="checkbox"/> DISCLOSURE OF LOBBYING ACTIVITIES		Exemption Subsection Pending or IRB App. Date _____			
<input type="checkbox"/> PROPRIETARY & PRIVILEGED INFORMATION		<input checked="" type="checkbox"/> INTERNATIONAL ACTIVITIES: COUNTRY/COUNTRIES INVOLVED			
<input type="checkbox"/> HISTORIC PLACES		NO RS			
<input type="checkbox"/> VERTEBRATE ANIMALS IACUC App. Date _____		<input checked="" type="checkbox"/> COLLABORATIVE STATUS			
PHS Animal Welfare Assurance Number _____		Not a collaborative proposal			
<input checked="" type="checkbox"/> TYPE OF PROPOSAL Research					
PI/PD DEPARTMENT Anthropology		PI/PD POSTAL ADDRESS 6100 MAIN ST			
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CERTIFICATION PAGE

Certification for Authorized Organizational Representative (or Equivalent) or Individual Applicant

By electronically signing and submitting this proposal, the Authorized Organizational Representative (AOR) or Individual Applicant is: (1) certifying that statements made herein are true and complete to the best of his/her knowledge; and (2) agreeing to accept the obligation to comply with NSF award terms and conditions if an award is made as a result of this application. Further, the applicant is hereby providing certifications regarding conflict of interest (when applicable), drug-free workplace, debarment and suspension, lobbying activities (see below), nondiscrimination, flood hazard insurance (when applicable), responsible conduct of research, organizational support, Federal tax obligations, unpaid Federal tax liability, and criminal convictions as set forth in the NSF Proposal & Award Policies & Procedures Guide (PAPPG). Willful provision of false information in this application and its supporting documents or in reports required under an ensuing award is a criminal offense (U.S. Code, Title 18, Section 1001).

Certification Regarding Conflict of Interest

The AOR is required to complete certifications stating that the organization has implemented and is enforcing a written policy on conflicts of interest (COI), consistent with the provisions of PAPPG Chapter IX.A.; that, to the best of his/her knowledge, all financial disclosures required by the conflict of interest policy were made; and that conflicts of interest, if any, were, or prior to the organization's expenditure of any funds under the award, will be, satisfactorily managed, reduced or eliminated in accordance with the organization's conflict of interest policy. Conflicts that cannot be satisfactorily managed, reduced or eliminated and research that proceeds without the imposition of conditions or restrictions when a conflict of interest exists, must be disclosed to NSF via use of the Notifications and Requests Module in FastLane.

Drug Free Work Place Certification

By electronically signing the Certification Pages, the Authorized Organizational Representative (or equivalent), is providing the Drug Free Work Place Certification contained in Exhibit II-3 of the Proposal & Award Policies & Procedures Guide.

Debarment and Suspension Certification

(If answer "yes", please provide explanation.)

Is the organization or its principals presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency?

Yes

No

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Certification Regarding Lobbying

This certification is required for an award of a Federal contract, grant, or cooperative agreement exceeding \$100,000 and for an award of a Federal loan or a commitment providing for the United States to insure or guarantee a loan exceeding \$150,000.

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The undersigned certifies, to the best of his or her knowledge and belief, that:

- (1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
- (2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure of Lobbying Activities," in accordance with its instructions.
- (3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, Title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

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Certification Regarding Flood Hazard Insurance

Two sections of the National Flood Insurance Act of 1968 (42 USC §4012a and §4106) bar Federal agencies from giving financial assistance for acquisition or construction purposes in any area identified by the Federal Emergency Management Agency (FEMA) as having special flood hazards unless the:

- (1) community in which that area is located participates in the national flood insurance program; and
- (2) building (and any related equipment) is covered by adequate flood insurance.

By electronically signing the Certification Pages, the Authorized Organizational Representative (or equivalent) or Individual Applicant located in FEMA-designated special flood hazard areas is certifying that adequate flood insurance has been or will be obtained in the following situations:

- (1) for NSF grants for the construction of a building or facility, regardless of the dollar amount of the grant; and
- (2) for other NSF grants when more than \$25,000 has been budgeted in the proposal for repair, alteration or improvement (construction) of a building or facility.

Certification Regarding Responsible Conduct of Research (RCR)

(This certification is not applicable to proposals for conferences, symposia, and workshops.)

By electronically signing the Certification Pages, the Authorized Organizational Representative is certifying that, in accordance with the NSF Proposal & Award Policies & Procedures Guide, Chapter IX.B., the institution has a plan in place to provide appropriate training and oversight in the responsible and ethical conduct of research to undergraduates, graduate students and postdoctoral researchers who will be supported by NSF to conduct research. The AOR shall require that the language of this certification be included in any award documents for all subawards at all tiers.

CERTIFICATION PAGE - CONTINUED

Certification Regarding Organizational Support

By electronically signing the Certification Pages, the Authorized Organizational Representative (or equivalent) is certifying that there is organizational support for the proposal as required by Section 526 of the America COMPETES Reauthorization Act of 2010. This support extends to the portion of the proposal developed to satisfy the Broader Impacts Review Criterion as well as the Intellectual Merit Review Criterion, and any additional review criteria specified in the solicitation. Organizational support will be made available, as described in the proposal, in order to address the broader impacts and intellectual merit activities to be undertaken.

Certification Regarding Federal Tax Obligations

When the proposal exceeds \$5,000,000, the Authorized Organizational Representative (or equivalent) is required to complete the following certification regarding Federal tax obligations. By electronically signing the Certification pages, the Authorized Organizational Representative is certifying that, to the best of their knowledge and belief, the proposing organization:

- (1) has filed all Federal tax returns required during the three years preceding this certification;
- (2) has not been convicted of a criminal offense under the Internal Revenue Code of 1986; and
- (3) has not, more than 90 days prior to this certification, been notified of any unpaid Federal tax assessment for which the liability remains unsatisfied, unless the assessment is the subject of an installment agreement or offer in compromise that has been approved by the Internal Revenue Service and is not in default, or the assessment is the subject of a non-frivolous administrative or judicial proceeding.

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By electronically signing the Certification Pages, the Authorized Organizational Representative (or equivalent) is certifying that the corporation has no unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability.

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When the proposing organization is a corporation, the Authorized Organizational Representative (or equivalent) is required to complete the following certification regarding Criminal Convictions:

By electronically signing the Certification Pages, the Authorized Organizational Representative (or equivalent) is certifying that the corporation has not been convicted of a felony criminal violation under any Federal law within the 24 months preceding the date on which the certification is signed.

Certification Dual Use Research of Concern

By electronically signing the certification pages, the Authorized Organizational Representative is certifying that the organization will be or is in compliance with all aspects of the United States Government Policy for Institutional Oversight of Life Sciences Dual Use Research of Concern.

AUTHORIZED ORGANIZATIONAL REPRESENTATIVE		SIGNATURE		DATE
NAME				
TELEPHONE NUMBER	EMAIL ADDRESS		FAX NUMBER	

PROJECT SUMMARY

Overview:

The Arctic region is changing rapidly. Arctic biophysical systems are deeply intertwined with global lifeworlds so that dramatic changes in this region are likely to be felt elsewhere. Only sparse knowledge exists about the interconnections between the changing Arctic environment and cultural systems of other regions. This proposal aims to establish the PanArcticon Research Program that applies multidisciplinary science, engineering, environmental justice, and participatory perspectives to different ways in which people and places in the Arctic as well as on the world map are being effected by processes associated with rapid Arctic change. The project identifies three work packages with inter-disciplinary focus in areas related to: Arctic Interconnections with Global Lifeworlds; Community Sustainability; and Data Management among Arctic Researchers and Community. The first aims to advance system-level understandings on emerging Energy Infrastructures and Hydrospheric and Chemospheric systems that connect the rapidly changing Arctic environment with cultural systems in other regions across the world. A second work package aims to elicit collective visions of sustainable livelihoods shaped within the local Barents region communities of Norway and Russia to create synergies that benefit interaction with hydrocarbon industry while generating new insights on what achieving sustainability means in a convergent way. The third package develops a content management framework and cyber infrastructure services platform allowing Arctic researchers to deposit content to a digital repository; and to encode relationships with other digital information. This program contributes to the NSF Navigating the New Arctic goals by examining consequences of change for Arctic Indigenous peoples; establishing tools to manage rapid physical and social changes; and developing bottom-up a U.S. academic research community across engineering and computational sciences.

Intellectual Merit:

The proposal offers an innovative program bringing together multi-disciplinary researchers who until now have been working on similar topics in separate latitudinal contexts. Work package one focuses on infrastructure in extractive frontiers while building interdisciplinary conversation about projected effects of sea level rise on human and natural systems by examining water management and how vulnerability planning modifies landscapes while rendering specific populations vulnerable. It draws attention to the dynamic effects of complex patterns of energy exchange on the atmosphere and its relationship to human life through new forms of representation. Work package two examines the balance of power-relations embedded in knowledge exchanges taking place over sustainable livelihoods in the context of hydrocarbon development, especially regarding the negotiated meanings of sustainability and corporate social responsibility. Work package three defines standards for data sharing so that information can be potentially normalized, developing a vocabulary for describing interrelationships of heterogeneous data within the broad domain of Arctic research.

Broader Impacts:

The project engages Rice University Departments that have an interest in creating a shared a community of interpretation about sustainable Arctic development; Securing resources to train Indigenous and early career academics involved in Arctic research; Creating new spaces of relevancy in policy knowledge that focuses on the ethics of economic and technical reporting; Creating roundtable formats that connect decision-makers located in centers outside the north with Northerners who are subject to globalizing policies beyond their control; and Map out the sources of data, information, and knowledge about northern development including communication techniques specific to public and private dissemination.

TABLE OF CONTENTS

For font size and page formatting specifications, see PAPPG section II.B.2.

	Total No. of Pages	Page No.* (Optional)*
Cover Sheet for Proposal to the National Science Foundation		
Project Summary (not to exceed 1 page)	1	_____
Table of Contents	1	_____
Project Description (Including Results from Prior NSF Support) (not to exceed 15 pages) (Exceed only if allowed by a specific program announcement/solicitation or if approved in advance by the appropriate NSF Assistant Director or designee)	15	_____
References Cited	4	_____
Biographical Sketches (Not to exceed 2 pages each)	4	_____
Budget (Plus up to 3 pages of budget justification)	9	_____
Current and Pending Support	2	_____
Facilities, Equipment and Other Resources	1	_____
Special Information/Supplementary Documents (Data Management Plan, Mentoring Plan and Other Supplementary Documents)	2	_____
Appendix (List below.) (Include only if allowed by a specific program announcement/ solicitation or if approved in advance by the appropriate NSF Assistant Director or designee)	_____	_____
Appendix Items:		

*Proposers may select any numbering mechanism for the proposal. The entire proposal however, must be paginated. Complete both columns only if the proposal is numbered consecutively.

1. Objectives

We aim to establish a five-year research program that applies multidisciplinary science, engineering, environmental justice, and participatory perspectives to the different ways in which people and places across the world are being affected by processes associated with rapid Arctic change. We will build inter-disciplinary and multi-disciplinary capacity through three aligned work packages that focus on: Arctic Interconnections with Planetary Lifeworlds; Community Livelihood and Sustainability; and Data Management and Accessibility among Arctic Researchers and Community Members.

The first work package establishes a new research cluster at Rice University's Center for Energy and Environmental Research in the Human Sciences (CENHS) whose current projects focus on multidisciplinary energy and the environmental study. We aim to create a new Arctic program that advances system-level understandings of emerging Energy Infrastructures and changing Hydrospheric and Chemospheric systems (ice melt, methane release, permafrost thaw) that connect the Arctic's rapidly evolving environment with cultural systems in other regions across the world. A second work package expands PI Boyer and Co-PI Mason's current NSF sponsored Arctic research on the role of consultant interactions with governments and local communities on imagining energy futures. Specifically, we aim to elicit collective visions of sustainable livelihoods shaped within the local Barents region communities of Hammerfest (Norway), Teriberka (Russia) and Naryan Mar (Russia, and to create synergies that benefit communities in their interaction with hydrocarbon industry while generating new insights on what achieving sustainability means in a trans-disciplinary way. In the third work package, we will build on our NSF Arctic research and proposed work packages 1 & 2 by developing a content management framework and cyber infrastructure services platform for qualitative research and knowledge management system that will allow Arctic researchers to deposit content to a digital repository; search, annotate, and collaborate around digital information; contribute to the curation of objects; and identify and encode relationships with other digital information.

	Work Package	NNA Research Objective
WP 1	Examines ecosystem alteration in the Arctic and its affects on human well-being in global environments	Advance system-level understandings on interconnections of Arctic and non-Arctic life worlds
WP 2	Examines perceptions of petroleum development by community actors within consultation, sustainable livelihoods, and corporate responsibility	Develop a typology of expectation that addresses how communities understand sustainability and corporate responsibility
WP 3	Builds data management and sharing framework for new and current research	Allow Arctic researchers to collaborate around digital information

Table 1: *Research Work Topics and Objectives*

Implementing this program will contribute to three of the NSF Navigating the New Arctic (NNA) goals: first, examining the far-reaching consequences of changes for Arctic residents, particularly indigenous peoples; second, establishing a network of tools to manage rapid physical and social changes; and third, developing bottom-up research by the U.S. academic research community across engineering and computational sciences.

2. Intellectual Merit

2.1. Work Package I: The Global Arctic: Interconnections Between the Arctic's Changing Environmental and Cultural Systems & Other Regions of the World

The Arctic region is changing rapidly. Arctic biophysical systems are deeply intertwined with the lifeworlds of the planet so that dramatic changes in this sensitive region are likely to be felt elsewhere. Only sparse knowledge exists about the interconnections between the Arctic's changing environment and the cultural systems of other regions across the world. Through collaboration among leading social and natural scientists, humanists, and policy and community leaders, we will pursue the hypothesis that environmental change in the Arctic is producing global effects impacting the lifeworlds of humans across the planet. We aim to advance system-level understandings on three emerging themes – Energy and Infrastructures; Water and Adaptations; Chemospheric and Toxicological Flows – that connect the Arctic's rapidly changing environment with cultural systems in other regions across the world.

Across the Arctic, communities are reporting changes in sea ice thickness, quality, and extent; changes in regional and local weather patterns; warmer seasonal temperatures; and shifts in wildlife migration and plant growth patterns that differ substantially from the historical variability in weather and climate in these regions (Friesen 2015). The magnitude and speed of alteration suggests significant potential impacts affecting populations and policies far beyond the Arctic (Arctic Council 2016:3; AMAP 2011; Arctic Council 2013; Ebinger and Zambetakis 2009). We respond to these concerns by connecting the Arctic region explicitly with high-risk areas including the U.S. Gulf Coast, Bangladesh, Southeast Asia, the Pacific Islands, and Alaska, because of sea-level rise and/or noticeable meteorological shifts (Kallis and March 2015; Kirksey 2015). We expect the outcome to be an innovative program bringing together researchers who until now have been working on similar topics in separate latitudinal contexts.

Theme 1 – Future Energy and Infrastructures: The Arctic is being dramatically altered through petroleum industries and installations of infrastructure that frame the region as an alternatively valuable or risky frontier. The US Geological Survey released estimates in 2008 that 25% of the world oil and gas reserves lie in the Arctic (13% of oil reserves and 30% of gas reserves), setting the stage for what many describe as a rush for the Arctic by imagining the region as the greatest remaining global hydrocarbon resource. New initiatives from Arctic Council member states are creating organizational processes suggesting the arrival of knowledge-intensive economies that will condition site-specific Arctic operations (Johnson 2010; Kristoferson 2014; Stammeler 2011). Stratigraphic mapping, mineral licensing, environmental assessments, and other practices of inscription are translating the Arctic into representations that can be compiled and compared, while simplifying landscapes into readable signs that can be taken in at a glance (Nuttall 2016). Imagining the Arctic as a frontier cultivates a sense of dynamic possibility (Bravo 2009; Powell 2008; Tsing 2005; Watts 2014). But infrastructure in resource frontiers invokes material practices, values, and global connections, shot through with ideas about oil as natural wealth while conditioning politics through pressure applied by the way elites, resource managers, and publics enhance or challenge regimes of property and capital accumulation (Coronil 1997; Mitchell 2006; Swyngedouw 2010; Weszkalnys and Richardson 2014). Thus, we aim to examine how infrastructure engages actors in the politics of resource extraction surrounding the political-environmental impact of non-renewable resources.

Theme 2 – Water and Adaptations: The UN Intergovernmental Panel on Climate Change (IPCC) identifies reductions in the extent and thickness of polar sea ice by 2–3% per decade (IPCC 2001), predicting a rise in sea level of 10–90 cm over the century (IPCC 2007). A continuing rise in sea level, combined with frequent and extreme weather conditions, is expected to contribute to erosion of and inundation along global coastlines. These changes have consequences for terrestrial and marine ecosystems. Discussion on impacts has not yet considered long-term localized ecological changes that multiply vulnerabilities for millions across the planet. Changes in large ice sheets and shrinkage of glaciers will impact global sea level, affecting coastal cities and low-lying areas (coastal protection, flood drainage), influencing millions of people’s daily use of water for personal consumption and agriculture while affecting vital infrastructures and their political logic of security (Grove 2014; Whittington 2016). Changes in sea ice combined with enhanced river inputs of freshwater will lead to substantial changes in ocean circulation. Warming of polar oceans, coupled with changes in ice coverage and river run-off, will alter marine ecosystems with consequences for globally-significant fisheries. Our contribution builds upon extended conversations about projected effects of sea level rise on human and natural systems (Brugger et al. 2013; Dawdy 2013; Fjord 2007; Jabareen 2013). In alignment with such projects, we aim to examine water management and how vulnerability planning modifies landscapes while rendering specific populations vulnerable, as well as various capacities to predict people’s response to water worlds (Braun 2014; Collier and Lakoff 2014).

Theme 3 – Chemospheric and Toxicological Flows: Emergent research on the accumulation of bio-chemical impressions in the bodies of those exposed to atmospheric chemicals draws attention to the status of greenhouse gases, carbon dioxide and methane, with a focus on impacts of anthropogenic emissions on Arctic climate and public health (Fortun 2012; Shapiro 2015). We aim to mobilize this research to draw attention to the dynamic effects of complex patterns of energy exchange on the atmosphere (gaseous envelope) and its relationship to human life through new forms of representation (Sloderdjik 2009). We build on earlier work that draws attention to respiratory diseases associated with population exposure to high concentrations of pollutant mixtures – particulates, methane, and carbon monoxide – through uses of biomass (wood, agricultural wastes) and coal for cooking (Kammen, 1995; Ezzati and Kammen, 2001). Our demarcation of Chemospheric and Toxicological Flows draws inspiration also from scientific and Indigenous assessments that the Arctic is an important indicator region of persistence and bio-accumulation of global flows of chemicals and toxins, including Persistent Organic Pollutants (POPs), radioactivity from the accident at the Fukushima Daiichi nuclear power plant, and other discharges associated with the decommissioning of older facilities (AMAP 2015). Major contaminants such as PCBs, DDTs, and other organochlorine compounds are found to be ubiquitous in the Arctic due to long-range transport from source regions further south. POPs resist breakdown reactions in the air, traveling long distances before being re-deposited into Arctic soils, vegetation, and bodies of water, causing degradation and making Arctic food webs vulnerable to bio-accumulative chemicals with impacts on human health as well de (Wit and Derek Muir 2009).

We situate these three themes amidst abundant evidence of change in Arctic snow and ice: reductions in mass and extent, in area, timing, duration, and thickness. The IPCC identifies reductions in the extent and thickness of polar sea ice by 2–3% per decade over the past 40 years, resulting in a corresponding rise in sea level of approximately 10 cm. At the same time, the

geopolitics of the Arctic's changing environment is empowering corporate knowledge systems to intervene into Arctic debates about community plans and infrastructure development, even shaping the efficacy of integrating local beliefs within Western institutions.

2.2. Work Package II: Visions of Indigenous Sustainability in Industry across the Arctic

Since the 1990s, public hearings, workshops, and consultation process involving Indigenous peoples have become a common means in North America, Europe, and in developing countries to initiate debate on the implications of natural resource development for local peoples (Armitage 2005; Cristensen and Grant 2007; Harrison 2001). Forums for community participation have important implications for corporations, governments, and lending institutions (Cooper and Elliot 2000), as they represent an efficient and cost-effective way to avoid conflicts between corporations and the concerns of local communities directly impacted by the adverse effects of development (Nadasdy 2005; Ferguson 1994).

We will elicit collective visions of sustainable livelihoods shaped within the Barents region local communities of Hammerfest (Norway), Teriberka (Russia) and Naryan Mar (Russia) with the aim of creating synergies to benefit communities in their interaction with hydrocarbon industry while generating new insights on what achieving sustainability means in a trans-disciplinary way. An individual workshop in each of these communities will take place with the goal of collecting empirical ethnographic data on local perceptions of sustainability, community participation and corporate responsibility. Building on the premise that the workshop form provides a constructive forum for mutual understanding, these encounters are designed to stimulate interaction between community members, researchers, industry and government actors by leveling the balance of power-relations embedded in Euro-American processes of multilateral consultation while elevating local perceptions and voices.

The Barents region is emerging as a new energy region capable of contributing to European Union energy security. The investment plans of international oil companies are raising concern over local community interests in the context of oil field and hydrocarbon development in environmentally sensitive areas. Our workshops focus on the local meanings of the resources being developed by involving participation of people living out on the land including Indigenous peoples and the oil industry laborers who work on infrastructure alongside them. At each workshop we will identify common denominators of sustainable livelihoods and corporate responsibility programs and make recommendations about local priorities in line with the ENSINOR (Environmental Impacts of Industrialization in Northern Russia) program of research that produced a declaration of co-existence between oil and gas companies and reindeer herding communities (Stammler 2010).

Two additional workshops will provide participating researchers opportunities to collaborate on fieldwork and data collection. The first of these will focus on planning including the training of three PhD students. The second will be a platform for presenting findings and for researchers to discuss similarities and differences revealed by data and to identify publications. Research objectives include developing a typology of community expectation that addresses how different communities understand sustainability and corporate responsibility; how these expectations differ within Russia; and how these expectations differ and/or are similar to Norway. We

hypothesize that differences within local communities' expectations about petroleum development assume different understandings about sustainability depending on the local meanings of the resources being developed and the people affected by proposed development, including investment schemes brought about as part of corporate responsibility programs. To test this hypothesis, we will address how petroleum development is perceived by different community actors within a broader authoritative discourse of consultation, community participation, sustainable livelihoods, and corporate responsibility.

Ways in which decisions are made, and how positions on resource development are taken, are influenced by multiple and complex factors neither wholly modern, nor wholly traditional. Participating in decision-making processes allows interactions between indigenous communities, government, and industry representatives to be sites of creativity and contestation, redefining conceptions of knowledge, impacts, rights, governances, and models of appropriate development (Nadasdy 2003; Olivier de Sardan 2005). This work package starts from these encounters in an exploration of not only present conceptions of harms and benefits associated with extractive industries, or power struggles between local communities and multi-national development corporations, but also as avenues utilized by local people to assert their own conceptions of the world (Stammler with Forbes 2009; Rushforth 1992).

Despite the deliberative nature of such encounters, we are concerned about the balance of power-relations embedded in knowledge exchanges taking place over sustainable livelihoods in the context of hydrocarbon development, especially regarding the negotiated meanings of “sustainability” and “corporate social responsibility”. While community hearings are presented as a culture-free medium for full participation of indigenous contributors, espousing Western ideals of participatory democracy (Webler & Renn 1995), such gatherings often gloss over inequalities that limit the ability for northern and indigenous peoples to effectively participate (Boyer 2010; Dokis 2010; Mason 2010). This is especially the case in Russia where industry representatives and community members do not express the full weight of their concerns (Stammler and Peskov 2008). Industry and government are reluctant to share the full scope of local impacts because of a desire to move forward with oil and gas activity as swiftly as possible, while community members may not express their full concerns within industry- and government-organized settings in which vested interests for development dominate.

Our workshops will provide the benefit of being organized by scholarly institutions with no direct ties to industry or government. We aim to shift the discourse of resource extraction and industrialization from one in which corporate culture informed by a bottom-line conception of sustainability dominates (Hepsø 2014, 2012), to the community-oriented discourses in which local meanings of sustainable livelihoods can be voiced and heard. The workshops will reveal the potential, the problems and pitfalls for collective agency (Lassiter 2005; NAS 1989), and through participation of guests from other regions foster inter-regional fruitful exchange among Arctic residents and workers. They will also help bridge the theoretical divide in the social sciences between indigenous and non- indigenous community sustainability and may allow integration of diverse if not contradicting views into one common framework.

2.3. Work Package III: Electronic Polar Information Center (EPIC): We aim to develop a content management framework (data management and curation) and cyber infrastructure services platform for qualitative research and knowledge management enabling Arctic researchers to easily collaborate around digital primary and secondary sources. A Research and Collaboration Phase will take place over a 36-month period beginning in year 3 and consist of identifying an integrated set of tools for Arctic researchers wishing to deposit content to a digital repository; search, annotate, and collaborate around digital information; contribute to curation of objects (enhancing object metadata; vetting object annotations); and identify and encode relationships with other digital information both with and external to repository.

A number of previously funded NSF digital information projects are complimentary to our proposed program, for example, the ELOKA Phase IV (NSF project # 1513438) *Optimizing Data Management Support for Community-Based Research and Observations Contributing to Arctic Science*. Nevertheless, these programs do not provide a network for externalizing and preserving Arctic qualitative research data; linking and coordinating Arctic researchers and community members across time and space; providing an extra-process role, in which researchers communicate with members of other research teams; including a meta-analysis component that seeks to analyze data across various distributions of qualitative research data. Our initial activity will occur during a three-day workshop (Workshop One) in which a Pilot Community of researchers will travel to Rice U to express their ideas about content management with a designated Rice “Cybergroup” consisting of specialists associated with Rice U Department of Computer Science (<http://www.cs.rice.edu/people/faculty/>) with expertise in data and knowledge management; systems analysis; metadata analysis; information retrieval; and project management. The Cybergroup will collaborate with the Pilot Community to begin a process of standards and best practices that can be applied to digital content and metadata, and to review areas where new technology development is required.

This collaboration will identify types of content collected in field work and the analog and digital formats on which this information is recorded; types of digital content that represent outcomes of research (creation of transcripts of interviews and common practices that guide creation of transcripts; spreadsheets or forms of content tabulation that summarize broad results of research); requirements for retrieving the heterogeneous information deposited in the repository (identifying critical information of digital content; identifying intellectual and logical linkages among diverse objects critical to enable synthesis of information gathered by researchers in the domain of polar research in general); the rights framework that guides data collection and publication in the domain of Arctic research (identifying common practices for releases to use information gathered from informants; issues of informed consent and cultural property rights that need to be documented and enforced in managing access to recorded cultural materials); the kinds of cyber infrastructure services needed to facilitate collaboration among researchers (services to enable preparation of information for deposit to repository; services to enable federated development of software tools to serve researchers, research centers, or communities); the modes of access needed for Arctic research data to promote understanding in the public of the diverse outcomes of social science research in Arctic regions.

Qualitative data are often collected through various mediums and only in recent years has the development of Internet technologies evolved to the point where such data can now be shared,

queried and retrieved through digital programs. Unlike quantitative data, where sets of numbers are easily transposed into digital format, the oral histories collected by ethnographers often reflect data recorded through a variety of fragile analog mediums that must be transformed to digital formats in order to be both shared across digital networks and to be preserved in the long term. Examples of these various mediums include analog audio recording (1/8 inch single channel cassette tape), typescript text transcription, analog video recording (1/2 inch VHS cassette tape), digital audio stereo or computer file, digital video computer file, or digital text computer. Because of the heterogeneity of forms around which qualitative data is registered, we argue that a proposal for data management and sharing must adopt approaches to translating these data forms into digital information that comply to emergent standards and best practices for creation of long-lived digital content. To assure longevity of this unique information, the project must also adopt best practices for describing the technical attributes of digital content (technical metadata); it must also retain information about analog sources of information and processes used for conversion to digital formats (administrative metadata).

While various mediums of qualitative data provide challenges for digital content management, the types of data themselves are often intrinsically related to narrative explanation. Unlike quantitative data, which can be compressed, qualitative data is difficult to cross-reference because it represents random information. Most forms of qualitative data, in fact, cannot be calculated and thus pose problems for meta-analyses across communities of data. Yet, it is only through meta-analyses across various bundles of data, that important research questions about the meaning of such data can be asked. Thus, we propose to create a retrieval, query and analysis system that can bring together heterogeneous data, or describe knowledge across these different forms of data. In effect, we aim to: identify and define standards for data sharing for Arctic research, that is, ways in which research information can be potentially normalized; develop a vocabulary for describing interrelationships of heterogeneous social sciences data and information meaningful within the broad domain of arctic researchers, and; express this vocabulary in an ontology of a digital content management system.

The project will select robust technology platforms that are both non-proprietary and whose future development is assured by broad adoption, organizational commitment for future development, and long-term financial viability. Wherever possible it will also seek to adopt well established and open standards and approaches to data and metadata representation (for example: standards documented by ANSI/NISO or ISO standards; W3C and IETF Requests for Comment). This approach will assure that information managed by the digital repository can be maintained into the future as standards and best practices continue to evolve.

3. Research Plan

3.1. Work Package I Plan: The Global Arctic: Interconnections Between the Arctic's Changing Environmental and Cultural Systems & Other Regions of the World

During years 1 through 3, we aim to organize three annual workshops with the purpose of identifying research questions, synergizing multidisciplinary expertise, and generating testable hypotheses for future joint research. The workshops will explore inter-latitudinal processes addressing gaps in the NSF Polar Programs planning process with the aim of positioning Rice U as a go-to location for state-of-the-art planning on Arctic-global research. In 2016, NSF Polar

Programs sponsored six “Arctic Horizons” workshops with the aim of assessing new ideas associated with the NSF Arctic Social Sciences Program. To date, these workshops have glossed over interconnections between the Arctic’s changing systems and other regions of the world.

Each year, invitations sent to approximately 15 Speakers, Delegates, and Early Career researchers four months prior to the workshop, and will be accompanied by three 1000-word white papers (one per theme) to frame topics of understanding that are focused on the Arctic region and global impacts. The white papers will be co-authored by PIs Boyer and Mason in consultation with a planning committee. **Day-One** will divide the time into two thematic ***Plenary & Open Discussion*** sessions, while **Day-Two** offers a third thematic session. Plenary sessions will consist of 20-minute Speaker presentations. Open Discussion sessions will allow expression of diverse viewpoints oriented towards integrating concepts and not just disciplinary goals. Delegates and Early Career researchers will be invited to contribute posters of their work. Social scientists, humanists and policy representatives from our own network offer an excellent starting point for identifying potentially relevant workshop participants. Current and past speakers at PI Boyer Cultures of Energy Symposium, now in its 6th year, can provide a source of high-quality speakers for **Theme 1: Energy and Infrastructures**, as can contributors to Co-PI Mason’s 2015 co-edited volume on the material aspects of the oil and gas industry and his *Cultural Anthropology* journal 2016 edited Hot Spots series on Arctic extractive industry. PI Boyer directs the current editorial collective for the premier journal *Cultural Anthropology*, where he can easily identify a wealth of participants for **Theme 2: Water and Adaptations** and **Theme 3: Chemospheric and Toxicological Flows**, providing cultural assessments of the human imprint on the planet’s cryosphere, biosphere, hydrosphere, and atmosphere. PI Mason’s previous tenure as Associate Director in the Office of the Alaska Governor (2000-2004) and his Fulbright Arctic Chair awards in Canada (2006), Norway (2013), and Russia (2017) offer potential opportunities to identify Arctic policy delegates for all 3 themes.

Rice University supports a number of centers and institutes from which we plan to identify participants working at the intersection of water, food, and energy, thereby positioning Houston as a global gathering point for latitudinal pairing research on the afore mentioned issues. Rice U’s Severe Storm Prediction, Education and Evacuation from Disasters (**SSPEED**) Center, can provide a source for participants for the “**Water**” part of **Theme 2**, as would the Nanosystems Engineering Research Center for Nanotechnology-Enabled Water Treatment or the Shell Center for Sustainability where researchers examine sea level rise and its consequences for coastal communities. There are several Arctic experts who focus on the “**Adaptations**” part of **Theme 2** that we would like to consider, including Thomas Thorton, Director at the Oxford Environmental Change Institute, and Shari Gearhard, at the National Snow and Ice Data Center, both of whom who work on Arctic Indigenous adaptations and sustainability. We would also consider government policy experts as participants, for example – Arctic Council Chairs, Karen Florini, of the Expert Group on Black Carbon, and Ulrik Westman, Chair, Arctic Contaminants Action Programme, each of whom could make an important contribution to **Theme 3**. The international scope of participation can hardly be stressed more, especially by Arctic-centered Nordic countries (Iceland, Denmark [Greenland], Norway, Finland, and Sweden) where we identify numerous participants working at the intersection of Arctic and non-Arctic areas, including those at Aarhus U Research on the Anthropocene (AURA) and at U Copenhagen’s “Waterworlds”.

Similar programs on multidisciplinary research are available here at home; UCSB’s Carsey-Wolf Center’s “Figuring Sea Level Rise”, comes to mind as an example.

Finally, we want to consider a potential role for Indigenous participants. Michael Williams, a Yup’iq and member of the National Tribal Environmental Council Committee, was the first Alaska delegate to the First Stewards Symposium, where he gave testimony from his community’s experience with erosion and permafrost melt. Roberta Reyes Cordero, a Coastal Chumash who specializes in cross-cultural mediation with the Bureau of Ocean Energy Management and NOAA, examines how local knowledge is interwoven with scientific-based policy to address the impacts of sea-level rise in Pacific coastal communities. There is also Kalei Nu’uhiwa, a practitioner of Papahulilani, who studies all aspects of the atmosphere – energies, cycles and isochronisms – from Hawaiian perspectives, and Ben Powless, a citizen of the Mohawk Nation who serves as Youth Liaison for the Indigenous Environmental Network, where he focuses on climate justice and resource extraction.

3.2. Work Package II Plan: Visions of Indigenous Sustainability across the Arctic

We aim to understand how sustainable livelihoods and corporate responsibility are invoked when engaged at the participatory level. We raise three questions to be addressed in community workshops: What are local conceptions among indigenous and industry workers about corporate responsibility for local communities and the environment? How are expectations of corporate responsibility and sustainability integrated with or disenfranchised from the consultation process? What are points of consensus between indigenous and western knowledge systems? To address these questions, we plan to: Discuss conceptions about resource development with community members to formulate an empirical characterization of local expectations. Discuss the expectations of corporate responsibility for external activities associated with sustainable livelihood through consultation. Identify strategies for translating key concepts for achieving shared understanding of each group’s stakes and mission. There are two types of workshops (WS): researcher workshops and community workshops.

Date	Summer 2018	Summer 2019	Summer 2020	Summer 2020	Fall 2020
Type	Researcher WS 1	Community WS 1	Community WS 2	Community WS 3	Researcher WS 2
Location	USA Rice University	Norway Hammerfest	Norway Murmansk (Teriberka)	Russia Naryan Mar	USA Rice University
Key Participants	NSF project	Extractive industry affected community	Extractive industry affected community	Extractive industry affected community	NSF project

During summer 2018, lead participants will convene at Rice University for a two-day planning workshop that focuses on cross project communication (initial research plans, publication, and mentoring activities). A key product of this activity will be establishing the participant list for upcoming community workshops and identifying individuals who will serve as workshop ambassadors and mediators during the 2019 workshop period. Fall 2018 and Spring 2019 will be

devoted to preparation of community workshops 1-3 which will take place in summers 2019 (1) and 2020 (2). Summers 2019 and 2020 will be devoted to coordination and execution of community workshops 1-3, as well as related research, through site visits in Russia and Norway. Three Community Workshops will be held according to same model, posing the same questions to ensure compatibility and comparability of results. Fall 2020 will be devoted to analytical work with the results of Community Workshops. A final researcher workshop 2 in Fall 2020 will take place at Rice U. This three-day workshop will include a one-day public symposium and the remaining two days will be used to workshop publications from the individual research streams and coordinate joint publications. Tentative project results and deliverables include preparing two sets of materials: academic and training materials allowing multiplication and set up of similar workshops. We plan for twelve academic publications and a “lessons learnt” public event to correspond with the final workshop. International cooperation and interdisciplinary partnership forms the core of this project, which combines the expertise of academic researchers on the Russian and Norwegian Arctic, energy and petroleum, indigenous peoples, environment and sustainability, and corporate responsibility.

Community Workshop 1 Hammerfest, Norway	Community Workshop 2 Teriberka, Russia	Community Workshop 3 held in Naryan Mar
Interests of fishers and the Sami population and interactions with petroleum companies and local authorities. Snøhvit and Goliat are first gas/oil fields north of the Arctic Circle to be developed in Norway. Statoil’s Snøhvit has requirements for developing local presence through financial support to organizations such as Pro Barents and PetroArctic. Statoil has entered into cooperation with higher education initiatives such as EnergiCampus Nord.	Investigate the developments around the Shtokman field. Though investment decisions are pending and timetable for exploration activities is yet open, Shtokman Development AG has launched a corporate responsibility program and local involvement focusing on ecological improvements in the area, increasing capacity of local employees, and interacting with indigenous populations and environmental organizations.	Investigate considerations brought forth by non-Russian and Russian companies and potential effects of their discrepancies on conceptions of corporate responsibility vis-à-vis sustainable livelihoods for local communities. The Kharyaga field is located in Nenets Autonomous Okrug developed from the Komi Republic, which offers additional dimension to thus multi-national development case.

PIs Boyer and Mason will coordinate with Florian Stammler (U Lapland) and Vidar Hepsø (Norwegian University of Science and Technology) on control of the project. Division of labor is along three main project activities: (a) community workshop organization (Mason and Stammler), (b) researcher workshop organization and analytical work (Mason and Boyer), (c) dissemination of results and knowledge transfer (Boyer, Mason and Hepsø). For each type of activity, responsible persons will ensure that tasks, activities, and milestones are achieved on schedule and with a high level of quality. Lead investigators will monitor budget for activity.

3.3. Work Package III Plan: Electronic Polar Information Center (EPIC)

3.3. Work Package III

Subsequent to Workshop One the Cybergroup will create a detailed project work plan for the following 12 months of Phase I beginning in year 3. Milestones in that work plan will include: Proposing a general framework for managing the major types of content to be processed from

legacy sources, including content management framework, data models for major content types, and a core ontology for expressing administrative and structural relationships among objects in the repository. This plan would be revised after vetting by the Pilot Community group; Creating prototypes in the digital repository representing each of the kinds of legacy content to be processed by the project in general. These prototypes would be exposed for evaluation by the Pilot Community both through a basic web interface and through web services (SOAP/WSDL) that enable direct access to repository content separately from the web user interface; Development of an indexing specification based on functional specifications compiled at workshop one. The indexing specification would be reviewed by the Pilot Community for implementation in Phase II; Coordinating with the Pilot Community to propose models for authorizing administrative (curatorial) access to the digital repository and related cyberinfrastructure services; Creating a model for documenting, expressing, and enforcing the rights framework developed by the Pilot Community for access to repository content.

A Phase II consisting of a Post-Pilot Community phase will take place during the final 24 months of the proposed funding request. In Phase II conversion of legacy source materials to digital formats will go into production, as will related metadata conversion/preparation and tasks related to ingesting content into the digital repository. Phase II will also represent the start of development of Cyber Infrastructure Services specified during the Workshop One and revised at Workshop Two at Rice University. Phase II will increase participation of Arctic researchers in the repository project. Increasing participation will take place through a design context that aims to create a cyclical relationship between two goals: (1) assuring that the infrastructure developed by EPIC satisfies the broad needs of Arctic researchers and related communities who collaborate around digital information, and (2) participation in the iterative design evolution of EPIC cyberinfrastructure services. Phase II of the project will therefore build a compelling level of critical mass in the EPIC digital repository and will engage a broad community of stakeholders in both the research communities and consumers.

Core Infrastructure. The Rice U Cybergroup is able to build infrastructure support for research projects from the diverse array of computational services hosted by the Cybergroup's general services partnership. The suggested software foundation for the Cybergroup's content management services is Fedora, an open-source framework whose name originated as an acronym for "Flexible Extensible Digital Object Repository". Initial development of Fedora began at Cornell University in 1997 with support for DARPA and the NSF; since 2001 it has been developed jointly by information scientists at Cornell and the University of Virginia with support from the Andrew W. Mellon Foundation. With a community of hundreds of implementers Fedora's sustainability and continued viability has been assured by a grants from the Gordon and Betty Moore Foundation. The award has enabled the creation of a non-profit organization devoted to continued central development of the Fedora platform and to coordinate the integration of related services and enhancements contributed by the Fedora user community at large. Fedora's appropriateness for the management of all kinds of digital content rests in the abstractness of its general architecture for managing digital objects, as well as metadata required to maintain their integrity and usefulness over time. Its suitability for highly integrative cyberinfrastructure efforts rests in its transparent and robust services framework, and unique support for relationship-based knowledge organization. The system maintains by default a range of administrative metadata about all content it stores, including: object attributes (filesize, MIME

types, etc.); an audit trail recording all transactions relating to individual digital objects (and optionally maintaining successive versions of digital content objects); and calculation of checksum values that can be referenced in audit procedures to authenticate the integrity of managed content. The system also allows content administrators to include formal definitions for content dissemination into the data model for specific categories of repository content. This makes it possible to provide different “views” of a digital object that respond to particular use cases.

4. Project Organization

4.1. Project Leadership

PI **Dominic Boyer** and Co-PI **Arthur Mason** comprise the project leadership. Boyer is Professor in the Department of Anthropology at Rice U and Director of CENHS. Boyer’s considerable publication record provides leadership skills required to frame thematic discussion for post-field and workshop publications. In addition to five books and over fifty journal publications, Boyer is a co-editor of *Cultural Anthropology* (2014-2018), and series editor for *Expertise: Cultures of Knowledge* at Cornell U Press. Mason is Research Scientist in the Department of Anthropology at Rice U and Fellow at CENHS. He has considerable experience in collaborating with Canadian, European, and Russian researchers through multiple Fulbright Chair awards (Canada, Norway, Russia) focusing on Arctic energy and infrastructures. He teaches courses relating to Arctic indigenous identity and extractive industries. Mason’s previous work experience with the State of Alaska and Alaska Native corporations provide him with leadership skills to frame workshops with attention to Arctic local concerns.

4.2. Planning Committee: Work package initiation will be carried out through a Planning Committee composed of 7 multidisciplinary Rice U faculty and 2 non-Rice U Arctic specialists. We expect Rice U’s Energy and Environment Initiative and Baker Institute to participate. Examining complex challenges such as rapid Arctic change require attention to interactions that play out within and between social and ecological systems. We aim to foster a community of interpretation around Arctic-global interconnections that gestures to the complex and purposeful without fully committing ourselves yet to framing which topics of understanding should be focused on the Arctic region and which topics should be focused on global impacts. For these reasons, we plan for an initial brainstorming sessions spring 2018 with the Planning Committee to identify workshop milestones and further address science outcomes.

Rice Faculty Committee Members

John Anderson, Academic Director, Shell Center for Sustainability

Research areas: Earth sciences, polar programs

William Arnold, Professor, Jones Graduate School of Business

Research areas: Geopolitics of energy, national security, exporting/importing resources

Philip Bédient, Professor of Engineering, Director, SSPEED Center

Research areas: Hydrologic modeling, flood prediction systems

Dominic Boyer, *Project Co-Leader*, Professor, Department of Anthropology; Director, CEHNS

Research areas: Renewable energy, media and professionalism, identity movements

Gerald Dickens, Professor, Department of Earth Sciences

Research areas: Paleoceanography, marine geology

Cymene Howe, Associate Professor, Department of Anthropology

Research areas: Arctic, energy and ecology, gender and human rights, Latin America
Arthur Mason, *Project Leader*, Research Scientist, Department of Anthropology

Research areas: Arctic, Indigenous identity, energy and environmental policy
Ken Medlock, Senior Director, Center for Energy Studies, Baker Institute

Research areas: Energy policy and economy, global natural gas
Non-Rice Committee Members

Karen Hébert, Assistant Professor, Environmental Studies, Carleton University
Research areas: Arctic environmental politics and sustainability

Peter Schweitzer, Professor, Department of Anthropology, University of Vienna
Research areas: Arctic Indigenous ethnicity and identity movements

Through PIs Boyer and Mason's NSF award on High North Arctic Futures (see below results of prior NSF support), we have networks among European policy centers, for example, NUPI, CICERO, and SINTEF, in Norway. We strongly encourage participation by a next generation of Arctic and non-Arctic researchers. Mason was a founding member of the Association for Polar Early Career Scientists, established during the IPY 2007-2008, and Boyer routinely involves students in CENHS activities; members from both of these groups will be involved.

4.3. External Participants: External partners for Work Package II include Sherpa Konsult, U Lapland's Arctic Centre (Florian Stammer), and NTNU's Center for Integrated Operations in the Petroleum Industry (Vidar Hepsø). Sherpa Konsult (<http://sherpaconsulting.no>) is a Norwegian consultancy with 25 years experience in social development services in northern Norway and Northwest Russia. It has extensive networks in the Barents Region, encompassing Northern Norway, Finland, Sweden and parts of Northwest Russia, having worked with regional development since 1980. Their network includes local and regional government, cross border projects with Indigenous populations, commercial activities with oil and gas majors and supplier networks. Sherpa has offices in Murmansk and Naryan Mar and will be retained to provide practical assistance in organizing community workshops. This assistance includes selecting the appropriate meeting venue in each location, providing audio and visual media services, simultaneous English-Russian translation, visa arrangements, coffee and lunch services, logistics including travel, accommodation and related services. It will also include consultations and advice on the selection of local and regional participants, including invitations.

5. Broader Impact: PanArcticon Research Program in Rapid Arctic Change

These past 10 years have seen a boom in Arctic policy clusters in the United States, including Wilson Center's Polar Initiative, Stanford U's Arctic Initiative at Hoover Institution, Harvard U's Belfer Center, and Columbia U's Center for Global Energy Policy. Following this interest, we aim to expand the research dimensions of the Center for Energy and Environmental Research in the Humanities (CEHNS) by creating a Pan-Arctic research program that focuses on Arctic-Global Interconnections, Community Sustainability, and Data Management and Accessibility. The prevailing wisdom behind Arctic policy clusters in the United States as well as those in Europe, Russia and Asia often centers on identifying economic solutions to problems that require a holistic and critical analyses of rapid Arctic change. As a result, a diverse set of stakeholders and the public are often unaware of the true challenges that democratic ideals in various parts of the Arctic face as a result of "environmental globalization" and become increasingly left out of

participation in the social and political process. While the diversity of stakeholders is increasing, no one has yet thought of creating a program that applies multi-disciplinary science, engineering, environmental justice, and participatory perspectives to the different ways that rapid change in the Arctic is affecting people and places across the world.

The research program we propose is a suite of Pan-Arctic work packages that will engage Rice University Faculty, Research Associates, and Departments and Institutes who share an interest in creating shared a community of interpretation about socially responsible and sustainable Arctic development; Secure resources to train Indigenous and early career academics involved in Arctic research; Create new spaces of relevancy in policy for multi-disciplinary knowledge that focuses on the ethics and politics of economic and technical reporting; Create roundtable formats that connect decision-makers located in centers outside the north with Northerners who are subject to globalizing policies beyond their control; Apply research approaches to Arctic and non-Arctic settings to discover ways it can be improved, refined, and altered, especially in light of new participants and knowledge forms available from the blogosphere; and Map out the sources of data, information, and knowledge about northern development including communication techniques specific to public and private dissemination.

6. Results of Prior NSF Support

Arthur Mason has had two NSF awards in this period: NSF Award No. 1216717, \$43,940.00, 3/1/11-2/1/13 (*EAGER: Assessing Comparative Research of Social Coordination on Russian Arctic Gas Development*), and NSF Award No. 1417570, \$769,635, 4/1/14-08/1/17 (*Energy Futures of the High North: A New Approach to the Study of Experts, Institutions, and Forms of Knowledge that Guide Arctic Hydrocarbon Development*), for both which he served as PI. The intellectual merit for the first award develops an understanding of social coordination in restructured energy markets in the context of Arctic natural gas development. The study drew from engagement with concepts of risk, including a preoccupation with ritualized learning environments among stakeholders in Arctic oil and gas developments. The intellectual merit of the second award identifies practices associated with experts involved in creating Arctic energy futures. The study draws from engagement with concepts of impression management, most centrally identifying a typology of forms that characterize three aims of consultant knowledge provisioning: First, drawing up distinct points of view about the energy future; second, staging knowledge in non-policy locations such as hotels, and other elite spaces; and third, repositioning the politics of energy policy from agenda setting to expert judgment.

Dominic Boyer has had two NSF awards in this period: NSF Award No. 1417570, \$769,635, 4/1/14-08/1/17 (*Energy Futures of the High North: A New Approach to the Study of Experts, Institutions, and Forms of Knowledge that Guide Arctic Hydrocarbon Development*); and NSF Award No. 1127246, \$148,491, 2012-2013 (*The Political Culture of Wind Power Development in Southern Mexico*), on both of which he served as co-PI. The first award's intellectual merit, broader impact, and relation to current proposal is outlined above. The second award is associated with Cymene Howe who is PI on that project. The award's intellectual merit yielded research results in several areas. First, the analysis of the federal state's wind power development in the past decade was bifurcated into a pre 2016 para-statal electricity utility, and a post-2016 ambivalence for public development. Since then, the dominant development scheme has favored

self-supply partnerships in which private wind developers negotiate long-term contracts with industrial clients (CEMEX, Walmart). Also, descriptions of stakeholder groups in the design and implementation phases of wind power development in the Isthmus suggested the federal state exercised a dominant authority in setting priorities, emerging first during the Salinas administration (1988-1994) and subsequently accelerated during the Calderón administration. Finally, we argue that the state's emphasis on top-down development strategy reinforced and in some cases increased exploitative and hierarchical social structures in the Isthmus, leading to unequal distribution of new resources like land-rents.

Key project publications for Mason: *Subterranean Estates*. Cornell U Press (co-edited with M. Watts, H. Appel). 2015; *Energy Image*. U Virginia Press (co-edited with D. Farquason). Under contract; *Arctic Abstractive Industry*. Berghahn Press, editor. Under contract; *Inside the Arctic Energy Salon*. Yale University Press. Ms proposal requested; Arctic movements in the Twenty-First Century, *Hot Spots, Cultural Anthropology*; *Hot Spots*, edited collection of fourteen authors for *Cultural Anthropology*; Inside the Energy Salon. *Journal of Business Anthropology*. 4(1)36-53. 2015; Introduction (with A. Appel & M. Watts), in A. Appel, A. Mason, and M. Watts, editors, *Subterranean Estates*. Cornell U Press. 2015; Events Collectives, in *Subterranean Estates*. Pp. 1-31; Growth Imperative, in R. Pincus and S. Ali, editors, *Polar Diplomacy: Energy, Environment, and Emergent Cooperation in the Arctic*. Yale U Press. 2015; Homo Energeticus. *Environmental Research Letters*. Vol. 8. No. 1, pp. 1-8. 2013; Cartel Consciousness and Horizontal Integration, in Energy Industry, in S. Strauss, S. Rupp, T. Love, eds, *Cultures of Energy: Anthropological Perspectives on Power*. Left Coast Press. Pp. 126-138. 2013.

Key project publications for Boyer include: Aeolian infrastructures, aeolian publics. *Limn* 7; Aeolian extractivism and community wind in Southern Mexico. *Public Culture* 28(2):215-235, 2016. (with C. Howe); Revolutionary Infrastructure in *Infrastructures and Social Complexity*, eds. P. Harvey, C. Bruun Jensen, A. Morita. Routledge, 2016; Anthropology Electric. *Cultural Anthropology* 30(4):531-539, 2015; Aeolian Politics. *Distinktion* 16 (1):31-48, 2015. (with C. Howe); Los márgenes del Estado al viento: autonomía y desarrollo de energías renovables en el sur de México. *Journal of Latin American and Caribbean Anthropology*, 2015. (with C. Howe and E. Barrera); Wind at the Margins of the State: Autonomy and Renewable Energy Development in Southern Mexico, In *Contested Powers*. J-A McNeish, A Borchgrevink and O Logan, eds., Zed Books, 2015, 92-115. (with C. Howe and E. Barrera); Energopower. *Anthropological Quarterly* 87(2):309-334, 2014; in addition, Boyer is currently revising a monograph on the politics of wind power development in Southern Mexico for the University of Chicago Press.

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Dominic Boyer, Ph.D.

Professional Preparation

Brown University	Providence, RI	Social-Cultural Anthropology	B.A.	1992
Univ. of Chicago	Chicago, IL	Social-Cultural Anthropology	M.A.	1994
Univ. of Chicago	Chicago, IL	Social-Cultural Anthropology	Ph.D.	2000

Appointments

2013-present	Professor, Dept. of Anthropology, Rice University
2009-2013	Associate Professor, Dept. of Anthropology, Rice University
2006-2008	Associate Professor, Dept. of Anthropology, Cornell University
2001-2006	Assistant Professor, Dept. of Anthropology, Cornell University

Products

Products most closely related to the proposed project:

1. "Energopower: An Introduction." *Anthropological Quarterly* 87(2): 309-334, 2014.
2. "Wind at the Margins of the State: Autonomy and Renewable Energy Development in Southern Mexico" In *Contested Powers: The Politics of Energy and Development in Latin America*, J-A McNeish, A Borchgrevink and O Logan (eds.), Zed Books, 2015, 92-115. (with Cymene Howe and Edith Barrera)
3. "Aeolian Politics." *Distinktion* 16 (1):31-48, 2015. (with Cymene Howe)
4. "Anthropology Electric." *Cultural Anthropology* 30(4): 531-539, 2015.
5. "Simply the Best: Parody and Political Sincerity in Iceland." *American Ethnologist* 40(2): 276-287, 2013.

Other significant products:

1. *The Life Informatic: Newsmaking in the Digital Era*. Cornell University Press, 2013.
2. "American Stio: Or, what late socialist aesthetics of parody reveal about contemporary political culture in the West." *Cultural Anthropology* 25(2):179-221, 2010. (with Alexei Yurchak)
3. "On the ethics and practice of contemporary social theory: from crisis talk to multiattentional method." *Dialectical Anthropology* 34(3): 305-324, 2010.
4. "Paradoxical Infrastructures: Ruins, Retrofit, and Risk." *Science, Technology and Human Values* 41(3), 547-565, 2015. (with Cymene Howe + 12)

Synergistic Activities

1. Helped design the first research center in the world devoted to sponsoring energy and environmental research in the arts, humanities and social sciences (CENHS).
2. Participated in Fulbright Senior Specialist Program and helped organize institution-building exercises at the University of Fés (Morocco) and the University of Auckland.
3. Founded a book series focusing on the cultural forms and impacts of contemporary expert practice and knowledge across the world, *Expertise: Cultures and Technologies of Knowledge*, Cornell University Press.

4. Editor, *Cultural Anthropology* (2015-2018), highest impact journal published by the American Anthropological Association.
5. Service on the American Anthropological Association's Labor Relations and World Anthropology Committees and as Treasurer for the Council for European Studies.

Arthur Mason, PhD

Professional Preparation

Columbia University	New York	Anthropology	BA	1992
University of Alaska	Fairbanks	Anthropology	MA	1996
University of California	Berkeley	Anthropology	PhD	2004

Appointments

2014-present	Visiting Associate Professor, Department of Anthropology, Rice University
2006-present	Research Associate, Arctic Institute of North America, U Calgary
2010-2014	Visiting Assistant Professor, Energy and Resources Group, UC Berkeley
2010-2014	Director of Projects, Renewable and Appropriate Energy Laboratory, UC Berkeley
2007-2010	Assistant Professor, Justice and Social Inquiry, Arizona State U
2006-2007	Lecturer, Department of Anthropology, U Calgary
2006-2007	Faculty Affiliate, Institute of Sustainable Energy and Environment, U Calgary
2005-2006	Lecturer, Energy and Resources Group, UC Berkeley

Products

Products most closely related to the proposed project:

1. Arthur Mason. (2017). *Energy Image: Hydrocarbon Aesthetics of Progress, Critique and Form*. University of West Virginia Press, series Energy & Society. (Co-edited with D. Farqhason). 220 pages.
2. Arthur Mason. (2016). Introduction: Arctic movements in the Twenty-First Century, *Hot Spots, Cultural Anthropology*.
3. Arthur Mason. (2016). Energy Image: Hydrocarbon aesthetics of progress and form, *Polar Geography*. Vol. 39, No. 2, 130–143
4. Arthur Mason. (2015). *Subterranean Estates: Lifeworlds of Oil and Gas*. Cornell University Press. (Co-edited with M. Watts, H. Appel). 420 pages.
5. Arthur Mason. (2015). Inside the Energy Salon: Installation and Illusions of Finality, *Journal of Business Anthropology*. 4(1)36-53. 2015.

Other significant products:

1. Arthur Mason. (2015). Introduction (with A. Appel & M. Watts), in A. Appel, A. Mason, and M. Watts, editors, *Subterranean Estates: Lifeworlds of Oil and Gas*. Cornell University Press. Pp. 1-31.
2. Arthur Mason. (2015). Naming an Endless Process of Indigenization, *Current Anthropology* 56(6), December, book review of J. Clifford's *Returns: Becoming Indigenous in the Twenty-First Century*.
3. Arthur Mason. (2015). Events Collectives: The Social Life of a Promise-Disappointment Cycle, in A. Appel, A. Mason, and M. Watts, editors, *Subterranean Estates: Lifeworlds of Oil and Gas*. Cornell University Press. Pp. 1-31.

4. Arthur Mason. (2015). Growth Imperative: Intermediaries, Discourse Frameworks, and the Arctic and Antarctic, in R. Pincus and S. Ali, editors, *Polar Diplomacy: Energy, Environment, and Emergent Cooperation in the Arctic*. Yale U Press. Pp. 42-52.
5. Arthur Mason. (2013). Homo Energeticus: Maturity, Inheritance, Identity, *Environmental Research Letters*. Vol. 8. No. 1, pp. 1-8. 2013.

Synergistic Activities

1. Public Symposium Organizer: “Political Economy of Oil and Gas” sponsored by Columbia University (2012); “North American Network on Energy and Society” sponsored by Government of Canada (2009); “Electronic Polar Information Center” sponsored Arizona State University (2009); “International Polar Year: Global Change in Our Communities” sponsored by Society of Advancement of Chicanos and Native Americans in Science (2008); “International Polar Year Early Career” sponsored by the International Arctic Social Science Association (IASSA) (2008).
2. Committee Member: Energy Institute of London (2012-present).
3. Section Coordinator: Association of Canadian Studies in the United States, Biennial Conference (2008-09); Western Social Sciences Association Conference (2007-08).
4. Council Member: IASSA Extraction Working Group (2008-present).
5. Founding Council Member: Association for Polar Early Career Scientists (2007-2008).

SUMMARY PROPOSAL BUDGET

YEAR 1

ORGANIZATION William Marsh Rice University				FOR NSF USE ONLY			
				PROPOSAL NO.	DURATION (months)		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Dominic Boyer				AWARD NO.	Proposed	Granted	
				A. SENIOR PERSONNEL: PI/PI, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)			
				CAL	ACAD	SUMR	
1.				0.00	0.00	0.00	
2.							
3.							
4.							
5.							
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)				0.00	0.00	0.00	0
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)				0.00	0.00	0.00	0
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1. (0) POST DOCTORAL SCHOLARS				0.00	0.00	0.00	0
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)				0.00	0.00	0.00	0
3. (0) GRADUATE STUDENTS							0
4. (0) UNDERGRADUATE STUDENTS							0
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)							0
6. (0) OTHER							0
TOTAL SALARIES AND WAGES (A + B)							0
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)							0
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)							0
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)							
TOTAL EQUIPMENT							0
E. TRAVEL 1. DOMESTIC (INCL. U.S. POSSESSIONS)							6,830
2. INTERNATIONAL							10,000
F. PARTICIPANT SUPPORT COSTS							
1. STIPENDS \$ _____							0
2. TRAVEL _____							19,350
3. SUBSISTENCE _____							4,125
4. OTHER _____							0
TOTAL NUMBER OF PARTICIPANTS (15)				TOTAL PARTICIPANT COSTS			23,475
G. OTHER DIRECT COSTS							
1. MATERIALS AND SUPPLIES							0
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION							0
3. CONSULTANT SERVICES							0
4. COMPUTER SERVICES							0
5. SUBAWARDS							0
6. OTHER							0
TOTAL OTHER DIRECT COSTS							0
H. TOTAL DIRECT COSTS (A THROUGH G)							40,305
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MDTC (Rate: 56.5000, Base: 16830)							
TOTAL INDIRECT COSTS (F&A)							9,509
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)							49,814
K. SMALL BUSINESS FEE							0
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)							49,814
M. COST SHARING PROPOSED LEVEL \$ 0				AGREED LEVEL IF DIFFERENT \$			
PI/PI NAME Dominic Boyer				FOR NSF USE ONLY			
ORG. REP. NAME*				INDIRECT COST RATE VERIFICATION			
		Date Checked		Date Of Rate Sheet		Initials - ORG	

SUMMARY PROPOSAL BUDGET

YEAR **2**

ORGANIZATION William Marsh Rice University				FOR NSF USE ONLY		
				PROPOSAL NO.	DURATION (months)	
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Dominic Boyer				AWARD NO.	Proposed	Granted
A. SENIOR PERSONNEL: PI/PI, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				NSF Funded Person-months		
	CAL	ACAD	SUMR	Funds Requested By proposer	Funds granted by NSF (if different)	
1.	0.00	0.00	0.00			
2.						
3.						
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0	
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00		0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		0	
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00		0	
3. (0) GRADUATE STUDENTS					0	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)					0	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					0	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					0	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)						
TOTAL EQUIPMENT					0	
E. TRAVEL 1. DOMESTIC (INCL. U.S. POSSESSIONS)					6,830	
2. INTERNATIONAL					10,000	
F. PARTICIPANT SUPPORT COSTS						
1. STIPENDS \$ _____			0			
2. TRAVEL _____			38,700			
3. SUBSISTENCE _____			8,250			
4. OTHER _____			0			
TOTAL NUMBER OF PARTICIPANTS (15)				TOTAL PARTICIPANT COSTS	46,950	
G. OTHER DIRECT COSTS						
1. MATERIALS AND SUPPLIES					0	
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION					0	
3. CONSULTANT SERVICES					24,500	
4. COMPUTER SERVICES					0	
5. SUBAWARDS					0	
6. OTHER					0	
TOTAL OTHER DIRECT COSTS					24,500	
H. TOTAL DIRECT COSTS (A THROUGH G)					88,280	
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MDTC (Rate: 56.5000, Base: 41330)						
TOTAL INDIRECT COSTS (F&A)					23,351	
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)					111,631	
K. SMALL BUSINESS FEE					0	
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)					111,631	
M. COST SHARING PROPOSED LEVEL \$ 0				AGREED LEVEL IF DIFFERENT \$		
PI/PI NAME Dominic Boyer				FOR NSF USE ONLY		
ORG. REP. NAME*				INDIRECT COST RATE VERIFICATION		
		Date Checked	Date Of Rate Sheet	Initials - ORG		

SUMMARY PROPOSAL BUDGET

YEAR 3

ORGANIZATION William Marsh Rice University				FOR NSF USE ONLY		
				PROPOSAL NO.	DURATION (months)	
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Dominic Boyer				Proposed	Granted	
				AWARD NO.		
A. SENIOR PERSONNEL: PI/PI, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				NSF Funded Person-months		
	CAL	ACAD	SUMR	Funds Requested By proposer	Funds granted by NSF (if different)	
1.	0.00	0.00	0.00			
2.						
3.						
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00	0		
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00	0		
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00	0		
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00	0		
3. (0) GRADUATE STUDENTS				0		
4. (0) UNDERGRADUATE STUDENTS				0		
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				0		
6. (0) OTHER				0		
TOTAL SALARIES AND WAGES (A + B)				0		
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				0		
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)				0		
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)						
TOTAL EQUIPMENT				0		
E. TRAVEL 1. DOMESTIC (INCL. U.S. POSSESSIONS)				6,830		
2. INTERNATIONAL				10,000		
F. PARTICIPANT SUPPORT COSTS						
1. STIPENDS \$ _____				0		
2. TRAVEL _____				58,050		
3. SUBSISTENCE _____				12,375		
4. OTHER _____				0		
TOTAL NUMBER OF PARTICIPANTS (15) TOTAL PARTICIPANT COSTS				70,425		
G. OTHER DIRECT COSTS						
1. MATERIALS AND SUPPLIES				0		
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION				0		
3. CONSULTANT SERVICES				67,290		
4. COMPUTER SERVICES				0		
5. SUBAWARDS				0		
6. OTHER				0		
TOTAL OTHER DIRECT COSTS				67,290		
H. TOTAL DIRECT COSTS (A THROUGH G)				154,545		
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)						
MDTC (Rate: 56.5000, Base: 84120)						
TOTAL INDIRECT COSTS (F&A)				47,528		
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)				202,073		
K. SMALL BUSINESS FEE				0		
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)				202,073		
M. COST SHARING PROPOSED LEVEL \$ 0				AGREED LEVEL IF DIFFERENT \$		
PI/PI NAME				FOR NSF USE ONLY		
Dominic Boyer				INDIRECT COST RATE VERIFICATION		
ORG. REP. NAME*				Date Checked	Date Of Rate Sheet	
				Initials - ORG		

SUMMARY PROPOSAL BUDGET

YEAR 4

ORGANIZATION William Marsh Rice University				FOR NSF USE ONLY		
				PROPOSAL NO.	DURATION (months)	
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Dominic Boyer				Proposed	Granted	
				AWARD NO.		
A. SENIOR PERSONNEL: PI/PI, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				NSF Funded Person-months		
	CAL	ACAD	SUMR	Funds Requested By proposer	Funds granted by NSF (if different)	
1.	0.00	0.00	0.00			
2.						
3.						
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00	0		
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00	0		
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00	0		
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00	0		
3. (0) GRADUATE STUDENTS				0		
4. (0) UNDERGRADUATE STUDENTS				0		
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				0		
6. (0) OTHER				0		
TOTAL SALARIES AND WAGES (A + B)				0		
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				0		
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)				0		
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)						
TOTAL EQUIPMENT				0		
E. TRAVEL 1. DOMESTIC (INCL. U.S. POSSESSIONS)				6,830		
2. INTERNATIONAL				10,000		
F. PARTICIPANT SUPPORT COSTS						
1. STIPENDS \$ _____	0					
2. TRAVEL _____	0					
3. SUBSISTENCE _____	0					
4. OTHER _____	0					
TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANT COSTS				0		
G. OTHER DIRECT COSTS						
1. MATERIALS AND SUPPLIES				0		
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION				0		
3. CONSULTANT SERVICES				60,000		
4. COMPUTER SERVICES				0		
5. SUBAWARDS				0		
6. OTHER				0		
TOTAL OTHER DIRECT COSTS				60,000		
H. TOTAL DIRECT COSTS (A THROUGH G)				76,830		
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)						
MDTC (Rate: 56.5000, Base: 76830)						
TOTAL INDIRECT COSTS (F&A)				43,409		
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)				120,239		
K. SMALL BUSINESS FEE				0		
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)				120,239		
M. COST SHARING PROPOSED LEVEL \$ 0				AGREED LEVEL IF DIFFERENT \$		
PI/PI NAME				FOR NSF USE ONLY		
Dominic Boyer				INDIRECT COST RATE VERIFICATION		
ORG. REP. NAME*				Date Checked	Date Of Rate Sheet	
				Initials - ORG		

SUMMARY PROPOSAL BUDGET

YEAR 5

ORGANIZATION William Marsh Rice University				FOR NSF USE ONLY			
				PROPOSAL NO.	DURATION (months)		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Dominic Boyer				AWARD NO.	Proposed	Granted	
				A. SENIOR PERSONNEL: PI/PI, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)			
				CAL	ACAD	SUMR	
1.				0.00	0.00	0.00	
2.							
3.							
4.							
5.							
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)				0.00	0.00	0.00	0
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)				0.00	0.00	0.00	0
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1. (0) POST DOCTORAL SCHOLARS				0.00	0.00	0.00	0
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)				0.00	0.00	0.00	0
3. (0) GRADUATE STUDENTS							0
4. (0) UNDERGRADUATE STUDENTS							0
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)							0
6. (0) OTHER							0
TOTAL SALARIES AND WAGES (A + B)							0
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)							0
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)							0
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)							
TOTAL EQUIPMENT							0
E. TRAVEL 1. DOMESTIC (INCL. U.S. POSSESSIONS)							6,830
2. INTERNATIONAL							10,000
F. PARTICIPANT SUPPORT COSTS							
1. STIPENDS \$ _____							0
2. TRAVEL _____							0
3. SUBSISTENCE _____							0
4. OTHER _____							0
TOTAL NUMBER OF PARTICIPANTS (0)				TOTAL PARTICIPANT COSTS			0
G. OTHER DIRECT COSTS							
1. MATERIALS AND SUPPLIES							0
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION							0
3. CONSULTANT SERVICES							0
4. COMPUTER SERVICES							0
5. SUBAWARDS							0
6. OTHER							0
TOTAL OTHER DIRECT COSTS							0
H. TOTAL DIRECT COSTS (A THROUGH G)							16,830
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MDTC (Rate: 56.5000, Base: 16830)							
TOTAL INDIRECT COSTS (F&A)							9,509
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)							26,339
K. SMALL BUSINESS FEE							0
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)							26,339
M. COST SHARING PROPOSED LEVEL \$ 0				AGREED LEVEL IF DIFFERENT \$			
PI/PI NAME Dominic Boyer				FOR NSF USE ONLY			
ORG. REP. NAME*				INDIRECT COST RATE VERIFICATION			
		Date Checked		Date Of Rate Sheet		Initials - ORG	

SUMMARY PROPOSAL BUDGET Cumulative

ORGANIZATION William Marsh Rice University				FOR NSF USE ONLY				
				PROPOSAL NO.	DURATION (months)			
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Dominic Boyer				AWARD NO.	Proposed	Granted		
A. SENIOR PERSONNEL: PI/PI, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				NSF Funded Person-months			Funds Requested By proposer	Funds granted by NSF (if different)
				CAL	ACAD	SUMR		
1.				0.00	0.00	0.00		
2.								
3.								
4.								
5.								
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)				0.00	0.00	0.00	0	
7. (0) TOTAL SENIOR PERSONNEL (1 - 6)				0.00	0.00	0.00	0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)								
1. (0) POST DOCTORAL SCHOLARS				0.00	0.00	0.00	0	
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)				0.00	0.00	0.00	0	
3. (0) GRADUATE STUDENTS							0	
4. (0) UNDERGRADUATE STUDENTS							0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)							0	
6. (0) OTHER							0	
TOTAL SALARIES AND WAGES (A + B)							0	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)							0	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)							0	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)								
TOTAL EQUIPMENT							0	
E. TRAVEL							34,150	
1. DOMESTIC (INCL. U.S. POSSESSIONS)								
2. INTERNATIONAL							50,000	
F. PARTICIPANT SUPPORT COSTS								
1. STIPENDS	\$		0					
2. TRAVEL			116,100					
3. SUBSISTENCE			24,750					
4. OTHER			0					
TOTAL NUMBER OF PARTICIPANTS (45)				TOTAL PARTICIPANT COSTS			140,850	
G. OTHER DIRECT COSTS								
1. MATERIALS AND SUPPLIES							0	
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION							0	
3. CONSULTANT SERVICES							151,790	
4. COMPUTER SERVICES							0	
5. SUBAWARDS							0	
6. OTHER							0	
TOTAL OTHER DIRECT COSTS							151,790	
H. TOTAL DIRECT COSTS (A THROUGH G)							376,790	
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)								
TOTAL INDIRECT COSTS (F&A)							133,306	
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)							510,096	
K. SMALL BUSINESS FEE							0	
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)							510,096	
M. COST SHARING PROPOSED LEVEL \$				0	AGREED LEVEL IF DIFFERENT \$			
PI/PI NAME Dominic Boyer				FOR NSF USE ONLY				
ORG. REP. NAME*				INDIRECT COST RATE VERIFICATION				
		Date Checked	Date Of Rate Sheet	Initials - ORG				

C *ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET

Budget Justification

Personnel

No faculty salary is requested for Rice efforts.

Fringe Benefits

None requested

Equipment

None requested

Other Direct Costs

None

Participant Support Costs – \$140,850

• **Work package 1:** TRAVEL and SUBSISTENCE – \$70,426 Total Requested for ~15 participants to travel to the Houston area for annual participation in 3 workshops.

Year 1 - \$23,475; Year 2 - \$23,475; Year 3 - \$23,475

Travel – \$19,350

- \$12,000 – Dom./Intl. airfare for ~15 participants at an average of \$800 p.p.
- \$5,850 – Hotel for ~15 participants at a nightly rate of ~\$130 per night, for approximately 3 nights per participant.
- \$1,500 – First and Last day of travel (\$50*2) for ~15 participants to the Houston area.

Subsistence - \$ 4,125

- \$1,800 – Three workshop lunches calculated at \$40 p.p. for ~15 participants.
- \$750 – One workshop dinner calculated at \$50 p.p. for ~15 participants.
- \$1,575 – Coffee breaks and continental breakfast calculated at \$35 p.p. for ~15 participants for three days

• **Work package 2:** TRAVEL and SUBSISTENCE – \$70,426 Total Requested for ~15 participants to travel to the Barents area workshops (Hammerfest, Teriberka, Naryan Mar) area for participation in 3 workshops.

Year 2 - \$23,475 (1 workshop); Year 3 - \$46,950 (2 workshops);

Travel – \$19,350

- \$12,000 – Dom./Intl. airfare for ~15 participants at an average of \$800 p.p.
- \$5,850 – Hotel for ~15 participants at a nightly rate of ~\$130 per night, for approximately 3 nights per participant.
- \$1,500 – First and Last day of travel (\$50*2) for ~15 participants to the Houston area.

Subsistence - \$ 4,125

- \$1,800 – Three workshop lunches calculated at \$40 p.p. for ~15 participants.
- \$750 – One workshop dinner calculated at \$50 p.p. for ~15 participants.
- \$1,575 – Coffee breaks and continental breakfast calculated at \$35 p.p. for ~15 participants for three days

Travel – \$84,150

Years 1 - 5 Domestic Travel: \$34,150

This includes annual \$6,830 for travel funding and registration fees for the PI, the Co-PI, and the two graduate students to attend one academic conference such as the annual American Anthropological Association meeting (AAA) or the annual Society for the Social Studies of Science (4S) to share research findings, have opportunities for scholarly exchange, and build networks of collaboration with peers.

Years 1 - 5 Foreign Travel: \$50,000

This includes \$10,000 for annual travel funding and registration fees for the PI, the Co-PI, and the two graduate students to attend one international academic conference to share research findings, have opportunities for scholarly exchange, and build networks of collaboration with peers.

Consultants - \$151,790

Work Package 2 - \$21,790

For this project we will retain Sherpa Konsult Consultants to provide practical assistance in the organization of workshops. Sherpa Konsult is a consultancy group with 25 years experience in social development services in northern Norway and Northwest Russia.

Y2 @ \$14,500. Expenses include the transportation, lodging and per diem for one conference coordinator from Sherpa Konsult, who is attending the two community workshops (6 days), as well as fees for conference facilities, equipment, visa fees, and practical support. Additional budgeted is planned for the services of two interpreters, which will offer simultaneous translations from Russian and English.

Y3 @ \$7,290. Expenses include the transportation, lodging and per diem for one conference coordinator from Sherpa Konsult, who is attending the one community workshop (3 days), as well as fees for conference facilities, equipment, visa fees, and practical support. Additional budgeted is planned for the services of two interpreters, which will offer simultaneous translations from Russian and English.

Sherpa Konsult fees

Transport coordinator \$1500 per workshop

Hotel coordinator \$130 per day

Coordinator per diem \$100 per day

Organization and Practical support \$600 per day

Coordination \$1500 per day

Work Package 3 - \$130,000

Systems Analyst/Programmer (to be hired) \$20,000 based on 20 percent of full time for years 3 and 4 (two years). The Systems Analyst/Programmer participates in analysis of functional requirements for digital repository services, including creation of functional requirements

specifications, data modeling, and compilation of data dictionaries.

Project Manager (to be hired) \$20,000 based on 20 percent of full time for years 3 and 4 (two years).. The Project Manager is responsible for specifying tasks of Cybergroup members, overall technical project planning and management.

Software Engineer (to be hired) \$20,000 based on 20 percent of full time for years 3 and 4 (two years).. The Software Engineer is responsible for analysis and implementation of security requirements, including analysis and documentation of modes of administrative, researcher, and consumer interaction with repository systems and interfaces.

Web Applications Developer (to be hired) \$20,000 based on 20 percent of full time years 3 and 4 (two years). The Web applications developer will participate in analysis of requirements for dissemination of content from the EPIC digital repository and for researcher, curator and consumer interaction with the repository and related cyberinfrastructure services.

Visual Resources Cataloger (to be hired) \$20,000 based on 20 percent of full time for years 3 and 4 (two years). Creates descriptive metadata for visual materials, including still images, video, maps and other visual objects, of legacy materials.

Metadata Analyst (to be hired) \$20,000 based on 20 percent of full time for years 3 and 4 (two years). The metadata analyst will be primarily responsible for identifying and specifying requirements for data representation and documentation, including: analysis of content and identification of frameworks for representation of textual data; identification of standards and frameworks for descriptive metadata; specifying requirements for structural metadata and procedures for representing these metadata using the METS framework; and specifying requirements for administrative metadata.

Digitization Technician \$10,000 based on 20 percent of full time during year two. The scanning technician is responsible for digitization of visual materials at the Digital Imaging Lab and coordinating with external vendors for reformatting of audio and video source materials.

Facilities and Administrative (F&A) Costs

F&A is charged at the federally negotiated rate of 56.5% of modified total direct costs (MTDC). MTDC excludes equipment costs (items costing \$5,000 or more); participant support costs, pooled graduate student tuition remission; and the amount of each subaward over \$25,000.

Current and Pending Support

(See PAPPG Section II.C.2.h for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.	
Investigator: Dominic Boyer	Other agencies (including NSF) to which this proposal has been/will be submitted.
Support: <input type="checkbox"/> Current <input checked="" type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title: Convergence NNA: PanArcticon Research Program for an Interconnected Global Arctic Source of Support: National Science Foundation Total Award Amount: \$ 425,000 Total Award Period Covered: 03/01/18 - 02/28/23 Location of Project: Rice University Person-Months Per Year Committed to the Project. Cal:0.00 Acad: 0.00 Sumr: 2.00	
Support: <input type="checkbox"/> Current <input checked="" type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title: The Global Arctic: A Workshop on Interconnections Between the Arctic Changing Environmental and Cultural Systems and Other Regions Across the World Source of Support: National Science Foundation Total Award Amount: \$ 48,705 Total Award Period Covered: 02/01/17 - 02/01/18 Location of Project: Rice University Person-Months Per Year Committed to the Project. Cal:0.00 Acad: 0.00 Sumr: 0.00	
Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title: Energy Futures of the High North: A New Approach to the Study of Experts, Institutions, and Forms of Knowledge that Guide Arctic Hydrocarbon Development Source of Support: National Science Foundation Total Award Amount: \$ 769,635 Total Award Period Covered: 04/01/14 - 08/01/18 Location of Project: Rice University Person-Months Per Year Committed to the Project. Cal:0.00 Acad: 0.00 Sumr: 2.00	
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title: Source of Support: Total Award Amount: \$ Total Award Period Covered: Location of Project: Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:	
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title: Source of Support: Total Award Amount: \$ Total Award Period Covered: Location of Project: Person-Months Per Year Committed to the Project. Cal: Acad: Summ:	
*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.	

Current and Pending Support

(See PAPPG Section II.C.2.h for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.	
Investigator: Arthur Mason	Other agencies (including NSF) to which this proposal has been/will be submitted.
<p>Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support</p> <p>Project/Proposal Title: Energy Futures of the High North: A New Approach to the Study of Experts, Institutions, and Forms of Knowledge that Guide Arctic Hydrocarbon Development</p> <p>Source of Support: National Science Foundation</p> <p>Total Award Amount: \$ 769,635 Total Award Period Covered: 04/01/14 - 08/01/18</p> <p>Location of Project: Rice University</p> <p>Person-Months Per Year Committed to the Project. Cal:12.00 Acad: 0.00 Sumr: 0.00</p>	
<p>Support: <input type="checkbox"/> Current <input checked="" type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support</p> <p>Project/Proposal Title: The Global Arctic: A Workshop on Interconnections Between the Arctic Changing Environmental and Cultural Systems and Other Regions Across the World</p> <p>Source of Support: National Science Foundation</p> <p>Total Award Amount: \$ 48,705 Total Award Period Covered: 02/01/17 - 02/01/18</p> <p>Location of Project: Rice University</p> <p>Person-Months Per Year Committed to the Project. Cal:0.00 Acad: 0.00 Sumr: 0.00</p>	
<p>Support: <input type="checkbox"/> Current <input checked="" type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support</p> <p>Project/Proposal Title: Convergence NNA: PanArcticon Research Program for an Interconnected Global Arctic</p> <p>Source of Support: National Science Foundation</p> <p>Total Award Amount: \$ 425,000 Total Award Period Covered: 03/01/18 - 02/28/23</p> <p>Location of Project: Rice University</p> <p>Person-Months Per Year Committed to the Project. Cal:0.00 Acad: 2.00 Sumr: 2.00</p>	
<p>Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support</p> <p>Project/Proposal Title:</p> <p>Source of Support:</p> <p>Total Award Amount: \$ Total Award Period Covered:</p> <p>Location of Project:</p> <p>Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:</p>	
<p>Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support</p> <p>Project/Proposal Title:</p> <p>Source of Support:</p> <p>Total Award Amount: \$ Total Award Period Covered:</p> <p>Location of Project:</p> <p>Person-Months Per Year Committed to the Project. Cal: Acad: Summ:</p>	
*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.	

FACILITIES, EQUIPMENT, AND OTHER RESOURCES

Rice University is a comprehensive Research I university providing ample technical and logistical support for faculty, students and professional research staff who will have ready access to state-of-the-art facilities and equipment in participating academic and research units.

The Department of Anthropology produces cross-disciplinary knowledge and has been educating generations of social change agents and cultural anthropology scholars. Our program is recognized as a leader in cultural anthropology and a pioneer in establishing full-fledged programs in the field. Private office space designated for the PI and Co-PI is available within the Anthropology Department at Rice.

The PI and Co-PI each have a password-protected computer and a printer connected to the secure, high-speed Rice network in their private offices. All of the personnel have access to basic office equipment (photocopier, fax machine, scanner, etc.) within the department.

Administrative support for the project is available from Anthropology departmental staff, the Center for Energy and Environmental Research in the Human Sciences (CENHS), and staff in the School of Social Sciences Dean's office.

Project personnel at Rice will utilize the resources available through Rice's library, including access to journals and books relating to study topics.

Data Management Plan

The proposed project will include human subjects data. The demographic data will be collected from semi-structured interviews and observation administered by the PI, co-PI, and student/postdoctoral researchers associated with this project, and will be entered into computers. The data will be transferred on DVD or external hard drives to Rice University.

Types of data, collections, other materials produced in the course of the project:

Digital Materials:

Digital recordings of interviews, presentations and conference proceedings

Digital photographs

Video images

Computer schemas (CMapping tools).

PowerPoint presentations

e-journal publications

Non-Digital Materials:

Transcriptions of the digital recordings

Written notes taken during meetings.

Conference brochures, pamphlets

Newspaper articles and media coverage

Business cards (contact information via email, telephone)

Hand-drawn schemas that emerge from data analysis

Printed materials from industry

Journal publications, edited volumes, annual reports from the Symposium-Workshop

Dissemination and Sharing of Research Results

Broader Audiences:

Electronic Polar Information Center as described in project description

Visual anthropology through an established internet-based enterprises, StudioPolar (studiopolar.com) and Paparazzi Ethnography (paparazzi-ethnography.com) where research findings are presented in broadly accessible formats for an audience curious about the Arctic and energy development.

Workshop publications will be available for download from Rice University's CENHS and Baker Institute, which reaches a broad audience.

Scholarly and Policy Audience:

Workshop publications will be available for download from Rice University's CENHS and Baker Institute which reaches policy makers

Summaries of workshop findings will be produced specifically for policy audiences

The PIs and graduate students will deliver findings at interdisciplinary workshops (Association of Polar Early Career Scholars) and conferences (Society of the Social Studies of Science) and publish in peer reviewed journals

Mentoring Plan

Graduate students at Rice University in the Department of Anthropology will have hands on participation in the organization and discussion of the three work packages. The mentors are Drs. Dominic Boyer, Professor, and Arthur Mason, Adjunct Associate Professor, housed in the Department of Anthropology. Rice graduate students routinely participate in CEHNS events and our work packages are designed to give graduate students broad exposure to hands on activity. Rice is an established research University with human subject protocols for responsible ethnographic fieldwork that the researchers would become familiar with through training and experience.