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An International Network-to-Network approach to generating new scientific community collaborations in the Gulf of Mexico and surrounding region - A Case Study

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2) Summary
2a) Power of Networks to Networks

The concept of the Network-to-Network (N2N) Gulf of Mexico (GoM) originated two years ago, as a means to bring together the more than 181 GoM networks that exist across market sectors, academia, and government. The purpose of N2N GoM remains to build a new community of communities based on shared priorities for solutions to climate forcing in the GoM region. Building a new community from existing networks and stakeholders allows new collaborations towards finding solutions to complex climate related risks that affect the social, economic, and environment elements within the GoM region. This network-to-network approach provides the opportunity to capitalize on new insights and perspectives for breakthroughs that accelerate transformation and leverage existing and new resources to attain solutions.

Successful development of a new community leveraged from existing networks starts with the alignment of networks based on individual network needs, capabilities and priorities. This

approach allows the identification of the most pressing needs in order to attain robust and actionable solutions for decision-making. The success of N2N GoM requires cross-sectoral, interdisciplinary and international risk-based solutions that transcend traditional boundaries. The network-to-network approach fosters focused innovation and targets use of limited resources for maximum societal, economic and environmental impacts.

Phase 1 in the establishment of N2N GoM was completion of the N2N GoM workshop held in Merida, Yucatan, Mexico 1-3 October 2019. Initial results were attained by developing a shared focus and establishing common priorities through the alignment of networks and stakeholders from the U.S. and Mexico This workshop brought together 40 representatives of GoM networks and stakeholders. Post workshop activity will continue to build N2N GoM and establish a solution-driven, international decadal strategic plan for the GoM region.

In parallel, a case study documented the Phase 1 methodology used to develop an international interdisciplinary network-to-network collaboration. This case study provides valuable insight as to the mutual scientific and technical advances attained through strengthening existing linkages and creating new diverse communities from traditional networks. Documentation of the network development including the value of network-to-network collaborations along with the challenges, barriers and resource investment necessary to establish a successful N2N GoM provides a roadmap for the development of future network-to-network collaborations.

2b) Significant Results
The significant project results include:
i. Establishment of N2N GoM as a potential leader in the GoM.
ii. Completion of Phase I of the network-to-network case study.
iii. Completion of the initial planning committee meeting held in Merida, Yucatan, Mexico 7-10 January 2019 to establish the goals and implementation strategy for the N2N GoM workshop.
iv. Engagement through the pre-workshop survey of the more than 181 GoM networks identified to date with a 25% completion response rate to the survey.
v. Completion of the 1-3 October workshop in Merida, Yucatan, Mexico that brought about 40 networks and stakeholders representatives together to initially develop N2N GoM.
vi. Completion of the N2N GoM website for information exchange
vii. Completion of the workshop exit survey having 30 responses with all responses indicating the desire to participate in the continued development of N2N GoM.
viii. Development of an interdisciplinary methodology for advancing convergence research to address complex societal challenges in the GoM.
ix. Presentation of the N2N GoM project lessons learned at the National Science Foundation (NSF) 2019 AccelNet Project Kick-Off Meeting the 28-29 October 2019 at the request of the NSF.

3) Project Scope
3a) Major goals
Three major goals were identified for this initial phase of N2N GoM as follows:

i. Align priorities among sectors/networks/stakeholders regarding priorities and solutions to climate variability in the GoM region. Specifically, commence the identification and prioritization of threats, vulnerabilities and consequences of climate forcing in the GoM with the specific goal to identify solutions.

ii. Develop the network framework for a successful international N2N GoM by identifying the attributes of a successful network and framing the initial N2N GoM collaborative model.

iii. Complete the initial case study assessment focused on the design and development of N2N GoM.

4) Specific Objectives
4a) Science
N2N GoM is focused on establishing an international interdisciplinary network-to-network collaboration that provides convergence in shared priorities to find scientific and technological, social and policy solutions in a systematic and strategic response to climate forcing in the GoM region. The use of a risk framework provides the means for partial alignment of networks and stakeholders through shared priorities as it pertains to threats, vulnerabilities, and consequences. First order priorities pertaining to threats and vulnerabilities include:

i. Advance solutions to the impact of climate forcing based on an integrated system of regional risk awareness and risk assessment for the GoM and surrounding natural and human ecosystems.

ii. Identify existing data baselines and the critical variables needed to measure climate impacts on physical, chemical, biological and social systems, including spatial and temporal engagement gaps.

iii. Understand the physical, biological, and ecosystem changes in the context of human vulnerabilities to climate variability from the community to international scale.

iv. Identify shared scientific research priorities and opportunities for leveraging resources including data, models, infrastructure, concepts, etc.

v. Develop a framework of existing scientific rationale addressing natural and anthropogenic threats (e.g. climate forcing) aligned to its social, economic and environmental impacts.

vi. Identify research priorities and recommendations for coordination/collaboration between states and countries, and between academic, market sectors and government agencies that address societal requirements.

4b) Network Development
The development of N2N GoM provides the opportunity to approach the GoM in a holistic fashion where individual network and stakeholder priorities are aligned and then clustered into regional priorities. A successful network-to-network will provide solutions to complex problems in a strategic and collaborative approach. Building N2N GoM allows the exchange of new ideas,

insights and perspectives, breakthroughs that accelerate transformation, leveraging of existing and identification of new ones, improving communication and information flow, and mobilizing more leadership. Specific objectives include:

i. Increase connectivity between academic, market sectors, government agencies and the public engaged in climate variability, resilience and adaptation of the GoM community at the national and international levels. In doing so, this new collaborative network brings together existing networks active in the GoM region providing the potential for the development of new communities.

ii. Define the critical attributes necessary for implementation of a successful international network and while doing so determine the needs, capacity and priorities of the engaged networks and stakeholders.

iii. Define the collaborative model for successful implementation of N2N GoM.

iv. Establish the path towards a decadal, international strategic plan for addressing the potential consequences of climate variability in the GoM region.

4c) Case Study

Successful development of the N2N GoM has the potential to positively change the social, economic and environmental conditions of the GoM region. Funding for this project was provided, in part, as a case study focused on documenting how to successfully build a new international community through engagement of existing networks, especially those of large magnitude and scale. The case study component of the project centers on the following elements:

i. Document the value and types of step functions attainable through leveraging the convergence of existing networks into new communities across and within disciplinary, institutional, and cultural boundaries.

ii. Provide a roadmap as to how to establish successful network-to-network collaborations that integrate private, federal, academic, non-governmental and international sectors.

iii. Identify possible solutions to potential barriers and effective mechanisms to establish a successful network based on lessons learned.

iv. Be accessible to the community at large through open access publication of the results.

5) Methodology

5a) Science (Risk Framework)

The vision set for N2N GoM is based on the improvement of decision-making for all networks and stakeholders committed to the resilience of the GoM in light of climate variability. This is why the proposed methodological framework is focused on Risk theory as inspired by the United Nations Disaster Relief Office (UNDRO, 1979). This theory introduces the concept of Risk Assessment as a state for a given spatial and time domain, with *Risk = Hazard × Vulnerability × Consequences* = $P(T) \times P(C|T) \times u(C)$. Where $P(T)$ is the *Hazard* or probability of a given *threat intensity* (T); $P(C|T)$ is the *Vulnerability* or conditional probability of experimenting a consequence or damage level (C) given likely threat intensities (T). This represents the fragility of the system or systems which withholds

the consequence or damage level. These consequences have a value u(C) in terms of social, economic, and/or environmental losses. The units for a state or risk are therefore expressed in the units of the values of the Consequences u(C).

The challenge for the N2N GoM workshop was to "identify" and "characterize"; a) the natural and anthropogenic threats prevalent in the GoM, b) the "systems" vulnerable to these threats (called from now on vulnerabilities), and c) the metrics used by policymakers to assess the social, economic and/or environmental losses derived from the damage to the systems/vulnerabilities withstanding the given threats. Notice that the scope of the workshop didn't include the assessment of the Hazard or P(T), of the Vulnerability P(C|T), nor of the loss values of the Consequences u(C).

Several challenges remain in advancing this methodology post N2N GoM, including: a) the modeling of the GoM's social, economic and environmental states of risk, as well as the integration of these efforts, for likely scenarios of concurrent threats, concurrent vulnerabilities, and concurrent losses or consequences, that is the process to complete a comprehensive risk assessment for the GoM; and b) the modeling of strategic interventions thought to mitigate GoM's states of risk, which is the process to complete a comprehensive set of risk management strategies. These would include the effect of interventions to improve GoM's resiliency and adaptation of its social, economic and environmental systems/vulnerabilities, and to produce policies aimed at reducing losses or consequences to secure the sustainability for the GoM.

Modeling methods of risk assessment and management for multiple and concurrent threats, vulnerabilities and consequences has been developed by Dr. Medina-Cetina, after his implementation of UNDRO's risk framework in the form of a Bayesian Network (Medina-Cetina and Nadim, 2008). This approach helped to design a risk-driven method developed to explore the cause-effect of "interventions" for real-time decision-making processes, specifically oriented to explore optimal risk mitigation. The proposed approach included mitigating actions such as coping capacity (e.g., monitoring and preparedness) and can be easily extended to other types of interventions such as resiliency and adaptation. UNDRO's elemental definition of risk in the form of a Bayesian Network is presented in Figure 1a. Risk mitigating actions, such as active countermeasures (AC) and passive countermeasures (PC), can be easily simulated using this definition (Figure 1b), where ACs aim at reducing the Hazard and the PCs aim at reducing the system's Vulnerability: both aim at reducing the state of risk. A key benefit of this approach is that it allows for the modeling of complex multi-threat, multi-vulnerability, and multi-consequence scenarios, along with different risk mitigation configurations. That is, the proposed approach can model both Risk Assessment and Management scenarios, which would facilitate a quantitative analysis to be used to generate well-informed policies to secure the sustainability for the GoM.

Figure 1. Elemental Bayesian Network representations of Risk Assessment (a) and or Risk Assessment and Management (b).

5b) Networks Development

Each of the more than 181 identified networks consist of a group of individuals with a common purpose. Typical network characteristics include: common objective(s), recognized value in the collaboration, a common knowledge base, a sense of belonging, realization of benefits from the collaboration, agreed methodology, and a common vocabulary, among others. Most networks are siloes not reaching out to other sectors or to unrelated elements. In the case of N2N GoM networks, the majority are within a specific country and do not engage internationally.

Network-to-network collaborations provide the means to advance scientific and technological discovery by creating a new community integrated from existing networks. This approach is not common given the complexity, cultural change and time necessary to establish such a collaborative model. Success in the development of a new N2N GoM requires this new network to provide members value, trust, a sense of community, leadership and effective communication. Understanding the requirements to establish these attributes first requires knowing the needs and values of each member. Several steps employed to attain this understanding include a series of pre-workshop, workshop, and post workshop surveys, as well as two focus group sessions during the workshop. For example, Working Group (WG)-4 focused on understanding the attributes of successful networks and WG-5 focused on attaining input from participants as to the N2N GoM collaborative framework. All 180 networks will be engaged post workshop to obtain additional data to understand needs, values and capacity of existing networks. The additional data gleaned allows the future mapping of the relationship among exiting networks and the re-clustering of these networks into new arrangements based on shared objectives and/or the ability to fill an existing gap (knowledge, capacity, technology, etc.).

5c) Case Study

A case study is the basic design that can accommodate a variety of disciplinary perspectives, as well as philosophical perspectives and can test or build theory. A case study incorporates random or purposive sampling, and includes quantitative and qualitative data. For these reasons, and for the N2N collaborative work, we followed a case study design as a methodological strategy.

The research team collected data before, during, and after the N2N workshop. The purpose of data collection was to have participants' input on the planning, designing, and implementation of the workshop as well as get their input on the content of the workshop. The data collection process reflected the Planning Committee (PC)'s collaborative effort to engage survey respondents, and later workshop participants, in the appreciative inquiry process. Data collection utilized three different tools, pre-workshop survey, focus groups (FG)s, and exit survey. Below is a summary of each of these data collection processes.

   i. **Pre-workshop survey:** The pre-workshop survey was a result of a collective effort among the PC to come up with a valid and reliable instrument to capture the perceptions of about 181 networks interested in the environmental changes in the GoM. The purpose was to prioritize the common challenges of multidisciplinary networks resulting from climate variability in GoM. In addition, the results would help networks with common

interests to engage with each other and help develop strategies to attain network objectives.

The PC developed the survey items and agreed upon 38 total questions. Some of the questions were Likert type, others were open ended. The items were critiqued by experts in the field and were pilot tested for clarity. NSF was provided the opportunity for input on the survey given the case study nature of the activity. Team members with Spanish as their native language translated the questionnaire to Spanish. The team used Qualtrics as a tool to distribute the survey. The team sent an e-mail invitation to 181 networks along with the survey link in April 2019, and then followed up with two e-mail reminders. A total of 46 usable responses were collected (response rate = 25.4 %). Results of the pre-workshop survey were shared with the workshop participants at the beginning of Day 1 of the workshop.

ii. **Focus groups**: The purpose of the FGs was to get participants' "reflection-in-action". Reflection-in-action refers to a dynamic process that occurs in sync with actions. Reflection-in-action encourages immediate feedback that is usually utilized to make changes in the moment. This type of reflection involves short feedback loops that may spark such feelings as confusion, bewilderment, or surprise. Knowing-in-action is a key element of reflection-in-action and aids in understanding what we know the action suggests is occurring rather than the action itself. In essence, reflection-in-action uncovers tacit knowledge that generally emerges during an "aha" moment (Reason & Bradbury, 2008; Schön, 1983).

The PC conducted two FG sessions during the first and second days of the workshop. The FGs provided firsthand perspectives on behaviors and interactions. FG interviews also provided authenticity to the research and supported the collaborative appreciative inquiry framework.

The first FG interview was conducted at the end of Day 1 of the workshop and was selected randomly from the different WGs. The participants were 2 females and 4 males. The second focus group interview was conducted at the end of Day 2 of the workshop and was selected purposefully based on the level of engagement throughout Day 2 activities. FG two participants included 3 females and 3 males. Both FGs engaged in a full hour dialogue and provided input on: workshop process, workshop progress, and workshop content. Results of the FGs were summarized and shared with the participants at the beginning of Day 2 and Day 3 activities.

iii. **Exit Survey:** The exit survey results provided "reflections on action" from the workshop participants. Exit surveys were complete by participants, as well as by PC members. The purpose of the exit survey was to get "reflection-on-action". Reflection-on-action takes place following the completion of an activity. It considers what went well and identifies opportunities for improvement. Reflection-on-action thus identifies best practices to leverage when facing similar tasks or dilemmas in the future. We reflect *on* action,

"thinking back on what we have done to discover how our knowing-in-action may have contributed to an unexpected outcome" (Schön, 1983).

The exit survey, as a tool, provided the participants with a) retrospection, or thinking back on their experiences during the workshop, b) self-evaluation, or analyzing and evaluating the feelings and actions associated with their experiences during the workshop, and c) reorientation, or using the results of self-evaluation to help the PC approach future situations. The PC developed the exit survey based on the activities of the workshop. The survey was distributed to workshop participants at the end of Day 3 activities. The survey consisted of 8 questions, two Likert type questions and 6 open ended questions. The team used Qualtrics as a tool to distribute the survey. Two team members fluent in Spanish translated the survey to Spanish. PC distributed the exit survey to all N2N participants by e-mail. A total of 30 usable responses were collected (response rate = 83 %). Table 1 below provides an overview of the research design and the data collection strategy.

Table 1. Data Collection Timeline, Tools, and process

Timeline	Tool	Purpose	Collection Process
April-September 2019	Pre-workshop Survey	- prioritize common challenges resulting from climate variability in the GOM. - engagement networks with common interests - future development of strategies to more effectively attain specific network objectives	- Used Qualtrics - 1 e-mail invitation - 2 follow-up e-mails 181 surveys were distributed 46 usable surveys collected
October 1- 2 2019	Focus Groups	Reflection-in-action - input on workshop process - input on workshop progress - formative assessment of workshop content	2 focus groups at the end of day 1 and end of day 2 2 groups of 6 individuals each
October 3, 2019	Exit Survey	Reflection-on-action - perceptions on the overall learnings from the workshop	Used Qualtrics to survey workshop participants. 30 usable responses.

iv. **PC exit survey:** The post workshop/project survey was developed for completion by members of the PC in an effort to glean individual perspectives concerning the success,

failures, and lesson learned. The survey consisted of 10 questions. The data was collected between 2 and 4 weeks post workshop.

6) Project Activities
6a) IRB Assessment for N2N GoM Case Study
Successful implementation of the case study required engaging network representatives through a variety of surveys and questionnaires. Documentation concerning the N2N GoM case study activities was submitted to the Texas A&M University (TAMU) Human Research Protection Program to ensure compliance with TAMU's commitment to the protection of human subjects involved in research. The TAMU office issued a finding that the effort was not human subject research indicating that further review and approval was not required for the project unless the effort deviates from the described activities.

6b) Establishment of the Planning Committee
The project PIs were established at the time NSF awarded the project. The PI team expanded into the project PC to increase the diversity and knowledge, as well as national and cultural perspective. This transformation also expanded the expertise across a variety of market sectors. The PC was limited to eight individuals (4 from the U.S. and 4 from Mexico) for overall effectiveness.

6c) Funding augmentation
Funding from the NSF were augmented with real dollars and/or in kind support to ensure the overall success of the workshop. The *Yucatan's Department of Research, Innovation and Higher Education (SIIES)* provided $25,000 through the *Yucatan Initiative Project* at TAMU for staff support, planning and workshop implementation*. The Society for Underwater Technology in the US (SUT-US)* provided staff support during the planning and coordination of the workshop. The *TAMU College of Geosciences* provided staff support for the coordination of the project. The *Harte Research Institute for Gulf of Mexico Studies (HRI)* at TAMU Corpus Christi, Texas provided support for the Co-PI representing HRI.

6d) Terminology
The complexity and diversity in the composition of the networks and stakeholders engaged in this effort required the definition of specific terms to ensure a common vocabulary. Key terms are included below.
   i.   **Network:** A number of entities (e.g., individuals, societies, companies, agencies, institutions, other) that are structured and actively working toward a shared vision/mission.
  ii.   **Stakeholders:** An entity that has an interest in the program and can affect or be affected by the program.
 iii.   **Market Sector:** An area of the economy in which businesses share the same or a related product or service. For the purpose of N2N GoM the 11 market sectors used by the New York Stock Exchanges were used as baseline categories. These include consumers (discretionary) consumers (staples), communication services, energy,

financials, healthcare, industrial, information technology, materials, real estate, and utilities. Other networks, such as academic and government networks are also incorporated into this effort in addition to those specific to a given market sector.

iv. **Threat:** Anything that can exploit a vulnerability; what we are trying to prevent against.

v. **Vulnerability:** Weaknesses or gaps; the inability of a system to adapt to a threat.

vi. **Consequences**: The potential for loss, damage or destruction of an asset/service as a result of a threat exploiting a vulnerability.

vii. **Solutions:** an action that can reduce the risk through a reduction in threat, vulnerability or consequences.

6e) Network Mapping

The PC identified existing GoM networks and stakeholders through internet searches, personal identification from network representatives, or PC members reaching out to specific networks. To facilitate public-private partnerships in network collaboration, networks were assigned to the specific sector with which it was most closely aligned. All identified networks were sent a pre-workshop survey. Following this, the PC assigned each network into one of three tiers based in part on size (number of institutions, individuals encompassed by the network, etc.), political attributes of the network (influence), network focus, and regional network extent. Tier 1 networks were assigned the highest priority for workshop participation and received initial invitations based on the networks' ability to establish and grow N2N GoM. Tier 2 networks were invited as workshop slots became available. Tier 3 networks were not invited to the workshop but are considered important in terms of long-term engagement for successful network development.

6f) Stakeholder Mapping

The PC identified specific stakeholders through network input and external recommendations. Stakeholder workshop participation was prioritized based on the ability of the stakeholder to contribute to establishing N2N GoM. Note that the stakeholders initially engaged in the N2N GoM effort were based predominately on the perspectives of the PC members. The number of identified stakeholders will increase as N2N GoM continues to develop.

6g) Planning Committee Meeting

A PC composed of the PIs combined with counterparts from the System of Research, Innovation, and Technological Development of the State of Yucatan (SIIDETEY*),* and the Consortium for the Investigation of the Gulf of Mexico (CIGOM), a Mexican multi-institutional academic network met the week of 7-11 January 2019 in Merida, Yucatan, Mexico. This was the first opportunity for PC to meet even though members were previously engaged with developing N2N GoM. The meeting goal was to refine the N2N GoM vision and develop the initial workshop framework. The discussions centered on the expectations and key workshop outcomes.

i. **Role of the Planning Committee:** The PC role was to deliver N2N GoM Phase 1 and to successfully deliver the workshop. This functionality was distinct from the anticipated Steering Committee (SC) whose anticipated responsibility was to elevate visibility and prestige of the N2N GoM profile.

ii. **Funding:** Established funding levels and funding priorities. Developed strategy to identify additional workshop sponsors to augment NSF funding.

iii. **Networks:** Discussions centered on a variety of ways to package sectors ranging from specific market sectors to development of a happiness index or genuine progress indicator, which would measure not only economic contributions but also progress in establishing human well-being. Overall objective was to develop a strategy for wide-ranging identification of existing networks and to determine a framework for grouping like networks. The PC agreed to use the 11 market sectors of the New York Stock Exchange as the major industry/private sector categories. Networks also were classified as academic or government networks. Networks were prioritized based on a preliminary evaluation of their relevance for specific market sectors, ability to influence change, ability to response to challenges and solutions, bi-national collaboration experience, and survey response.

iv. **Workshop location and venue**: Multiple workshop venues were explored. The Hyatt Regency in Merida, Yucatan, Mexico was selected based on overall value, location, and quality of staff.

v. **Steering Committee:** The PC identified the desire to establish a workshop SC that would enhance the regional and international reach of N2N GoM and that would potentially provide additional funding opportunities. The SC concept was removed from consideration in subsequent discussion due to cost and ability to attain the appropriate individuals.

vi. **Refined Workshop Program:** the PC discussed the value of a 3-day vs 4-day workshop. The view was that reducing the workshop to three days would provide greater opportunities for individuals to participate without losing the ability to deliver the specific outcomes. The workshop agenda was reviewed in this context and the PC agreed to a 3-day rather than 4-day meeting. This decision came at the expense of allowing greater time for social engagement during the workshop. A draft agenda was developed.

vii. **Keynote speakers /Panelist:** Discussion centered on the type of speakers that were necessary to provide the participants an understanding of climate impact within the holistic GoM region (similarities between the northern and southern gulf regions). Key was the need for workshop participants to understand the commonalities of the shared risks throughout the GoM region in response to climate variability and the need for network-to-network collaborations.

viii. **Network weaver:** The PC discussed the possible need to engage a network weaver to help coordinate the network development component of the workshop. Several conversations with experts concerning this resulted in the PC electing to do this independently.

ix. **Assessment:** The PC reviewed the pre-workshop, workshop, and post-workshop assessment strategy. The pre-workshop survey and outcome mapping was reviewed. The final draft pre-workshop version was submitted to NSF for comment. The PC also discussed the strategy for workshop FGs and the post workshop survey.

x. **Marketing:** Marketing elements were discussed to improve the visibility of N2N GoM. Suggestions included the design of a logo, website, press release and possible press conferences.

xi. **Website:** The purpose and content for the website were defined with emphasis placed on the website as an interactive communication tool during the workshop, as well as the primary communication tool with all networks.

xii. **Milestones:** Critical milestones and timelines necessary to develop new network-to-network collaborations were identified.

xiii. **Phase 2 strategy**: Discussion centered on defining key elements necessary to establish N2N GoM. These included the opportunities, value proposition, milestones, timelines, challenges, barriers, and mechanisms.

xiv. **Reports:** Identified an initial strategy for meeting the program needs to make the science and case studies available in the open literature. In addition, identified the need for providing NSF with a detailed project report.

xv. **Field Trips:** The desire for social opportunities to support the network-to-network linkages were discussed, but such opportunities were limited given the reduction to a three-day workshop. Arrangements were made to provide interested individuals the opportunity to tour the Yucatan cultural sites independently from the workshop activities.

6h) Science

Five elements are critical to deliver the long-term objective of establishing a decadal strategic plan for the GoM that provides solutions to the impact of climate variability within the GoM region. N2N GoM Phase 1 provides the foundation to complete these elements during N2N GoM Phase 2. This multiyear approach provided the framework for the initial phase of N2N GoM. These elements include the following:

I. **Develop the Risk Framework:** Focused on strategies to develop elements of the risk framework. Specifically threats, vulnerabilities and consequences with an emphasis on prioritization of and possible solutions to threats and vulnerabilities across sectors for the GoM region.

ii. **System Mapping:** Two mapping components include: (a) the development of the system mosaic of articulating the linkages of threats, vulnerabilities, and consequences for the GoM region, and (b) over printing the network and stakeholders onto the mosaics to create new community clusters based on shared objectives, interests, capacities, and needs.

iii. **Gap Analysis:** The need to develop current baselines of capacity was discussed. Critical variables include data availability, network capacities, technology, etc.

iv. **Roadmap strategy:** Development of the decadal agenda for the GoM that is solution driven and that brings together networks stakeholders and funding entities to attain those high priority solutions.

v. **Engagement and Solution-building:** With stakeholders and science end-users, define possible solutions (research, policies, products, services, innovation); determine what is possible without resource (data, funds, time) limitations; develop solution descriptions and requirements (impact and benefits; requirements (required knowledge base, technology, resources, known efforts, and other)).

6i) Network Development

Network engagement is the most critical element for successful network development and significant time and effort continues to be invested to this end. One critical element is understanding the knowledge, capacity and resources of each network. A strategy consisting of an information sheet/pre-workshop survey, and one-to–one phone calls were employed to engage each priority network.

Key outcomes for the workshop also were defined and included the identification of active networks, network specific priorities, and the framing of the concept of creating new communities based on shared priorities. These initial steps contribute to the longer-term objectives to identify network capacity and new communities based on shared priorities. Also important was the initial framing of the N2N GoM collaborative model that addresses the need to balance solution driven outcomes towards an eventual decadal agenda integrated with network attributes such as governance, membership, commitments and others.

6j) Case Study

Discussion centered on introducing the four steps (Figure 2) of inquiry methodology to ensure that members were on a similar level of knowledge and understanding. The pre-workshop, workshop, and phase 1 post workshop elements focused on the initial three steps: Discover, Plan, and Design. N2N GoM Phase 2 will concentrate on the 4th step, Deliver.

Figure 2. The method of inquiry used during the N2N GOM Project Phase 1.

6k) Logistics

i. **Network/Stakeholder participation:** As discussed above, network and stakeholder participation were prioritized based on the ability of the network to help advance N2N GoM. Three tiers were established given the limited number of workshop spaces available. Tier one networks and stakeholders were highest priority. Tier three networks and stakeholders were lowest priority. All PC members agreed on network and

stakeholder placement. PC members issued invitations for participation in English or Spanish, and appropriate Secondary letters and phone calls were completed as necessary to confirm network and stakeholder workshop representation.

ii. **Coordination:** Participant coordination concerning workshop activities was completed through emails, phone calls, and the N2N GoM website. The website was a critical component of the workshop as all WG elements were facilitated through the website.

iii. **Flight Reservations**: TAMU personnel worked closely with workshop participants to arrange flight schedules. All reservations and bookings were completed by the N2N GoM team and billed directly to the project. In several cases participants required modifications to flights because of work related activities. N2N GoM Staff completed such changes.

iv. **Bus Reservations:** In several cases, individuals required travel by bus to attend the workshop. N2N GoM staff arranged this transportation. These expenses were billed directly to the project.

v. **Hotel Reservations:** Investigations concerning the host hotel commenced in January 2019. A contract was signed 29 March and billed directly to the project. The agreement included guest rooms, breakfast, coffee breaks, lunch, and meeting rooms. The arrangements and contract were coordinated by PC members and TAMU staff. The N2N GoM team coordinated with participants concerning their travel dates to and from the workshop.

vi. **Meals**
   a. <u>Breakfast</u>: Breakfast for guests staying at the hotel was included in the room rate.
   b. <u>Lunch</u>: In order to maximize time for the WGs, the PC established a *"working lunch"* philosophy. This resulted in lunches being brought into the WGs rather than breaking for a more formal lunch within the hotel property or elsewhere.
   c. <u>Dinner</u>: Locations were identified and pre-booked in advance of the workshop. Contracts were put in place when necessary to secure the location.
   d. <u>Coffee Breaks</u>: Coffee was available throughout the day rather than holding formal coffee breaks. This was included in the hotel package.

vii. **Inauguration and closing ceremonies:** It is a tradition to hold formal welcoming and closing ceremonies when hosting a meeting in Mexico. These ceremonies are cultural and provide the means to welcome all guests and set the stage for the meeting outcomes, as well as the results. This was an important element for the Governor's office. The team from the Governor's office coordinated these events.

viii. **Breakout strategy:** Each Working Group (WG) consisted of about five breakout groups. Each breakout group was designed for about eight participants to allow effective discussion. The actual number of participants per breakout group fluctuated based on the preferences of the workshop participant. In general, the PC requested that when appropriate, participants stayed with the same breakout group to facilitate deeper relationship building and conversation. For example, participants remained together in the same groups for both WG-2 and WG-3, as well as for WG-4 and WG-5. Each breakout group had a facilitator (a member of the PC) and a note taker. The note taker was a volunteer student from the local university. Forms for each breakout group were available through Goggle documents and the N2N GoM website. Work from each breakout group was captured in real time and incorporated into a summary for discussion in plenary sessions by all workshop participants (see appendices).

ix. **Communications:** English was the primary language for the workshop. Translation services were provided for individuals where proficiency in English was limited.

x. **Transportation:** Transportation to and from the airport was typically the responsibility of the participant. Exceptions were made when participants requested assistance to get from the airport to hotel or vice versa. The Yucatan government organized group transportation to and from the hotel and dinner.

xi. **Workshop Registration:** Registration consisted of participants signing in and receiving a meeting agenda, nametags and a small gift package. The Yucatan government and local communities provided the gift package.

6l) Conference Calls

Conference calls commenced among the PIs at the time of project award. These teleconference calls were monthly for the autumn of 2018 up to the initial PC meeting in January 2019. Conference calls continued monthly through the spring of 2019 and then advanced to weekly calls during the late summer/fall 2019 in preparation for the October 2019 workshop.

6m) Workshop

The distribution of the 181 identified networks are shown in Figure 3. Forty of these Networks and Stakeholders participated in the workshop. The workshop incorporated a variety of strategies and methods to attain the overall goals. The three workshop elements (science, network development, and case study) were organized as follows. The first two days focused on the science plan while the third day focused on network development. The science plan involved coordinating WGs of 6-8 participants to focus on the identification and prioritization of threats facing the GoM region resulting from climate forcing, prioritizing five threats to identify vulnerabilities across market sectors and regions that were associated with each threat. In addition, WGs were used to identify desirable network attributes, functions and potential barriers to success. Small groups of workshop participants facilitated by a member of the PC ensured that objectives and outcomes were consistent among groups, and that everyone could participate based on their specific knowledge and perspective. Each group documented their results and reported back to all workshop attendees, providing a basis for discussion and analysis of commonalities and differences, both during and after the workshop.

i. **Day 1**: Workshop expectations for both network and case study; review of pre-workshop surveys results; potential effects of climate variability on the GoM and surrounding region (Keynote I / Panel); identification and prioritization of threats and vulnerabilities (WGs 1 & 2); and case study (FG1).

ii. **Day 2**: Potential effects of climate variability on the GoM and surrounding region continued (Keynote II; completion of threats and vulnerabilities (WG2); identification of consequences and possible solutions to vulnerabilities (WG3); and case study (FG2).

iii. **Day 3**: Network development and focus group outcomes. Identification of the attributes of a successful network (WG4); develop the N2N GoM collaborative model (WG5); define next steps; and complete the workshop exit survey.

Figure 3. Initial distribution of the identified networks existing in the GoM region.
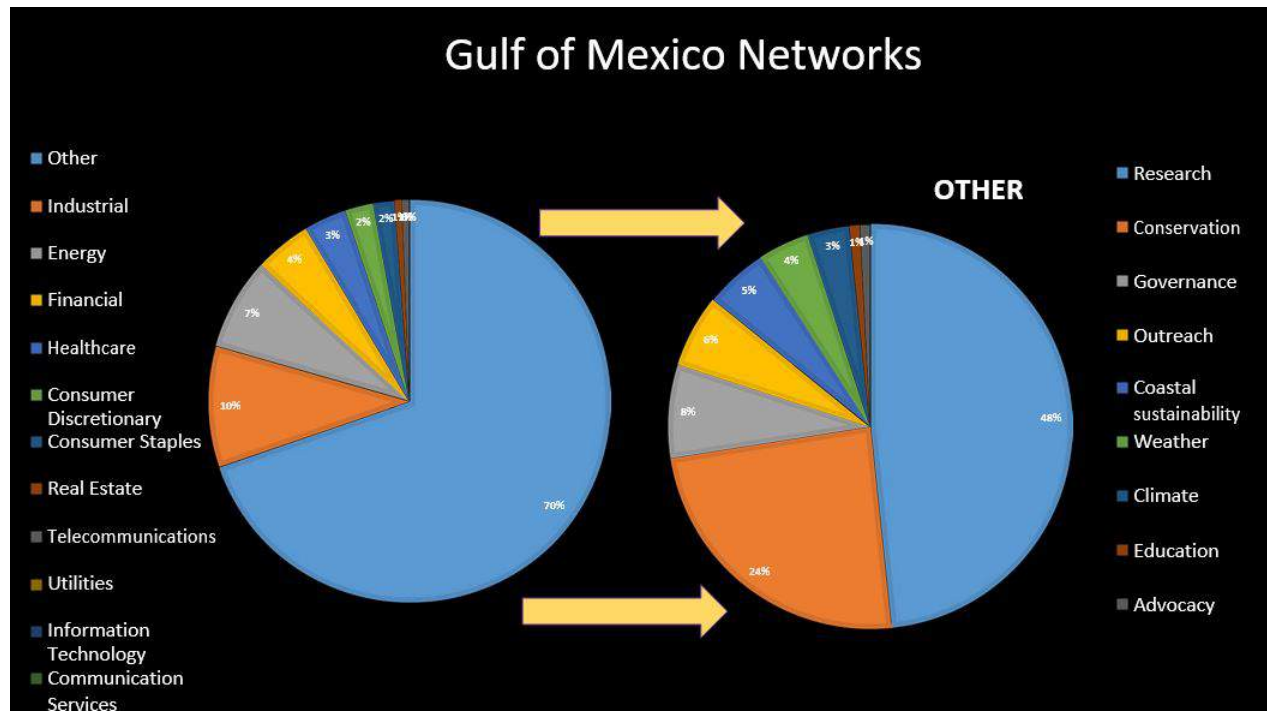
6n) Science Strategy

The proposed sequence of WGs (WG1 – WG3) defining the first segment of the workshop program follows the definition of *Risk = Hazard × Vulnerability × Consequences* = P(T) × P(C|T) × u(C) (as defined in the Science section). Working Groups 1, 2 and 3 were formulated to "identify" and "characterize" the GoM's top priority threats, systems/vulnerabilities, and consequences respectively.

i.   **Working Group 1:** Working Group 1 (WG1) was broken down in subgroups to consider representatives from the main market sectors present at the workshop (energy, materials, technology) and the remaining representation was divided in two more groups called broader impacts A and B (including academic, non-governmental networks and others that did not clearly align with a market sector). The task to be addressed by each group was: a) to identify climate-related threats relevant to their sector for the coming ten years in the Gulf of Mexico, b) to provide a clear definition of these relevant threats, and c) to prioritize the top three most relevant threats, including a discussion of the arguments to support their prioritization. After these independent evaluations per sub-group sector were completed, and representatives

of each sub-sector identified their top three threats, a discussion was organized with all workshop participants to reach a consensus in the selection of the top five threats, which was the deliverable of WG1. This served to frame the remaining working groups as discussed below.

ii.   **Working Group 2:** Working Group 2 built on the top prioritized sectoral "threats" identified in the WG1 outcomes. Each breakout group focused on a specific threat and developed a cross sectorial listing and prioritization of specific vulnerabilities related to the specific threat. WG2 described each vulnerability for future discussion related to exposure, sensitivity and adaptive capacity in first order terms. Specific vulnerabilities were priorities based on potential impacts of the vulnerability to the economic, environmental and social resilience of the GoM and surrounding coastal communities. For the purpose of the discussions, vulnerability was described as the degree to which people or the things they value are susceptible to, or are unable to cope with, the adverse effects of climate variability.

iii.   **Working Group 3**: The objective of WG3 was for participants to engage in a process to identify the consequences of the identified threats and vulnerabilities, and then dream solutions, i.e., what could be/what is required, who is already working and where, where the gaps are, what technologies and best practices exist, network linkages, etc. The WG was instructed to use this information to propose both the optimal solution (their "moonshot") as well as their more practical solution or solutions. Key draft elements for this process included:

a.   Threat: Reflect on and revise the written draft statement of the threat and associated vulnerabilities, considering:
   1. Why is it important to you to address this threat and vulnerabilities? How could the detailed description of the threat and vulnerabilities be improved so that it captures what your network or stakeholders care about? (i.e., the consequences).
   2. Does the description necessitate participation from and collaboration between networks and stakeholders? How could it be improved?

b.   Dream: Dream the "moonshot" or "sueño guajiro" - possible solutions to the threats and vulnerabilities, focusing on those that would represent a breakthrough. For each solution, describe:
   1. The solution / moonshot
   2. Does the solution address a threat, vulnerability or consequence?
   3. What is the spatial scale of the solution?
   4. What is the temporal scale?
   5. Elaborate on the potential impacts of the solution

c.   Resource and Gap Analysis: Participants were asked to conduct a detailed gap analysis to identify current baselines and priority information and resource needs, including:
   1.   Who are the key networks/players that are already working in this area?
   2.   What data already exists to assist? (data can be social, environmental and economic data, including observed data and models).
   3.   What technology exists that can be useful?
   4.   Are there examples of this solution being implemented?

5. Where are the overall gaps? (e.g., across data, people, funding, technology, policy, regulations, etc.).

d. Opportunities: Given the gap analysis, what are the opportunities you foresee as most feasible to bring resources (i.e., funding, data, people and models) together to make progress toward our moonshot? What are the limitations?

6o) Network Development strategy

i. **Working Group 4:** The objectives were to identify and rank the network functions, attributes and barriers to success that were considered most important by workshop attendees for the purposes of N2N. Network functions answer the question: what do you want your network to do? Attributes describe the characteristics of a network that contribute to its success, and barriers are challenges or conditions that may hinder network success and need to be addressed explicitly. Breakout groups were provided with a list of functions, attributes and barriers to success and asked to discuss and rank them. Additional categories could be added to the lists. For attributes and barriers, the lists were identical to those included in the pre-work shop survey, which will allow for a comparative analysis of the perception of attributes and barriers to success at the individual and N2N GoM network levels. In addition, participants were asked to address the following two questions in writing: identify your network needs pertaining to N2N GoM, and identify what your network can contribute. Those responses will be analyzed by the Steering Committee to line up network objectives with needs and capabilities.

ii. **Working Group 5:** The objective of WG5 was to obtain input from all participants concerning the content of a DRAFT collaborative framework for N2N GoM. This workshop input will be integrated into the development of the N2N GoM framework following the workshop. Key draft elements presented for discussion and modification include the following:

a. Purpose: Use the power of networks to comprehensively address the economic, environmental and social threats facing the Gulf of Mexico and surrounding coastal communities caused by climate variability.

b. Goals: (1) Provide multinational connectivity among networks, sectors, and stakeholders; (2) Establish network and stakeholder clusters addressing specific T/V/C solutions; (3) Leverage existing capacities and resources for attaining shared solutions; (4) Obtain new resources for attaining shared solutions; (5) Develop and implement a multinational, cross sectoral, decadal agenda for the GoM and surrounding region; and (6) Engage and inform decision makers in finding solutions to reduce risk.

c. Values: Embrace a culture of excellence and respect regardless of age, cultural identity, gender identity or expression, nationality, physical and mental ability, political and ideological perspectives, racial and ethnic identity, religious and spiritual identity, sexual orientation, or social and economic status. Leverage diversity and foster inclusion to deliver innovation of ideas that can translate into breakthroughs and accelerate transformation. Cultivate a dynamic and transparent environment of collaboration.

d. Resources: (1) Leverage existing resources through sharing (where appropriate) knowledge, data, expertise, facilities, etc.; (2) Attain resources through traditional

venues; (3) Joint funding proposals to state and federal agencies; (4) Attain resources through new venues; (5) Sectoral partnerships & collaborations; (6) Joint multinational funding proposals to state & federal agencies; and (7) Partnership with foundations; (8) Development of state and federal, multinational collaborations.

e. Membership: Include networks and stakeholders that: (1) Share the vision of N2N GoM and are willing to contribute to the success of the initiative; (2)Are engaged in the GoM and surrounding communities; and (3) Are engaged in some aspect of climate change and adaptation in the GoM.

f. Organization: The Steering Committee will provide the initial coordination and framing of N2N GoM. The Steering Committee will be responsible for effective communication, coordination, and engagement. The Working Groups will be established to focus on specific threats, vulnerabilities and/or solutions.

g. Governance: (1) All N2N GoM members have equal representation; (2) SC will consist of initial proponents and additional interested individuals selected to increase diversity, knowledge, and expertise; (3) The SC chair will be selected from the SC members; (4) WGs will be commissioned/decommissioned by the SC; (5) WGs will be populated by N2N GoM members and other thought leaders as required; and (6) N2N GoM bylaws will be drafted by the SC and ratified by N2N GoM members. The bylaws will be established by simple majority; and (7) Formal agreements will be developed by the SC as required.

h. Coordination: (1) SC will meet quarterly via teleconference; (2) SC will meet in person twice each year; (3) Working groups will meet as necessary; and (4) N2N GoM members will meet twice annually via teleconference and once annually in person.

i. Member incentives: (1) Increased efficiency and reduced cost; (2) Leadership development and implementation of solutions; (3) New and diverse collaborations; (4) Collaboration on funding opportunities and; (5) Contribution to the development and implementation of the decadal GoM agenda.

6p) Case Study Strategy

The PC followed a case study strategy for empirical inquiry to study the N2N collaborative effort using multiple data collection sources to provide evidence for the case. The case study strategy allowed the PC to observe the participants as a collective or as a conglomerate of different parts and aspects within the appreciative inquiry framework. The research team looked at the workshop as a case and wanted to have a better understanding of the whole experiences (the science, the participants, and the research team). The aim was to explain holistically the dynamics of a social unit (the participating networks) and to capture the collective output of the appreciative inquiry process while preserving the unitary character of the N2N group (as a main unit or case).

6q) Training opportunities

Seven students from local universities volunteered to participate in the workshop as note takers. Each student worked with the working group facilitator to ensure that the discussions were captured in real time. This experience provide students the opportunity to engage with network and stakeholder leadership; engage in understanding international scientific research and

program development, as well as critical issues facing the GoM resulting from climate forcing, and opportunity for one on one engagement with experts in the students' specific field of interest, and further development of language skills.

7) Project Outcomes

7a) Overview

The focus of this project was to establish a network-to-network framework that aligns networks with common interests to find solutions to the impacts of climate forcing within the GoM. The initial project phase identified and engaged the 181 GoM networks and Stakeholders identified. In addition, paramount to this phase was documenting the strategy and implementation on building a new community from existing communities. The success of the first phase of this project was the engagement of stakeholders both pre-workshop and during the workshop held 1-3 October in Merida, Yucatan, Mexico. The workshop outcomes are discussed below.

7b) Workshop Outcomes

I. **Science Working Group 1:** Working Group 1 identified, characterized and prioritized their corresponding sectorial threats for the coming ten years for the GoM. The summary of the independent evaluation of representatives of the five sub-groups representatives is presented in Table 2:

Table 2. Summary of independent identification, characterization and prioritization of Threats for the Gulf of Mexico resulting from WG1 discussion.

WG SECTOR	THREAT Priority 1	THREAT Priority 2	THREAT Priority 3
ENERGY	**Climate Change:** Changes in weather patterns and environmental physical and chemical characteristics, which would modify system behavior and have an impact on land and marine ecosystems and infrastructure; sea level rise (for existing industry)	**Geopolitics and Economics:** Public and private policies and economics can significantly change the management of resources, from local, to regional and global regions. Social tensions may arise at different scales, disrupting the function of the ecosystems and infrastructure. This may lead to social stratification, that is, extreme weather and climate change would	**Innovation:** Transition to a more variable and uncertain climate will demand having information available to better plan future developments of local, regional and global sectors requiring food, energy, water.

		amplify social inequalities, produce migration, crime, etc., limiting stability for energy developments.	
MATERIALS	**Water Quality & Quantity:** Contamination and availability.	**Extreme Weather / Tipping Points:** Climate variability (sea level rise, sargassum increase, altered hydrological cycles, acidification, rising temperature, intensity/frequency hurricanes)	**Innovation (or Lack of):** Innovative solutions requires data and information to better understand relevant problems, strategize for optimal solutions, produce technology transfer, and motivate investment.
TECHNOLOGY	**Extreme Weather Events:** Increasing and direct threats to human populations	**Oil Spills:** Health impacts, fishing industry, large mammals and pelagics communities.	**Plastics:** Ecosystem disruption, health impact, people care; knowledge transfer
BROADER IMPACTS-A	**Changes in Ocean Chemistry due to Climate Change:** Acidification, point and non-point, plastics	**Sea Level Rise:** Captures a broad range of problems, including ocean acidification, pollutants, **plastics**, etc. Gulf-wide, habitat loss.	**Extreme Weather Events**: Hurricanes/cold fronts, flooding; increasing frequency and intensity.
BROADER IMPACTS-B	**Sea Level Rise** (long term planning) and **Extreme Weathe**r (short term response)	**Social Stratification:** Environmental impacts (e.g. extreme weather and climate change) would amplify the social inequalities, produce migration	**Political Climate:** Needs to keep pace with climate change. Need to be proactive in a very short period of time. Think in terms of long term effects.

From the summary table above, a group discussion followed as part of the plenary of WG1 to analyze results of Table 2. This effort resulted in the definition of a consensus to define the top five threats for the GoM. These are listed starting from the most relevant: extreme weather, geopolitics, innovation (or lack of), water chemistry, and sea level rise.

Notice that the top five threats included both natural and anthropogenic processes, and although other threats were identified and characterized during the independent sub-groups, for the purpose of the workshop only the top five threats were considered and used to guide and facilitate discussions of WG2 and WG3. All other threats captured during the subgroup discussions are still relevant and will be used in the following phases of N2N GoM to create a decadal strategic plan for the GoM region. The same criteria was set for WG2 (systems/vulnerabilities) and WG3 (consequences).

i. **Science Working Group 2:** WG2 identified the vulnerabilities associated with climate forcing in the GoM region. The majority of the discussions focused on three elements (social, economic, and environmental) of the coastal communities. It was recognized that in the context of the social/ecological framework systems can have a natural or non-natural adaptive capacity, which determines the level of vulnerability. Vulnerability in part is the inability of a system to adapt to a threat. Vulnerability can

be 0 if a system is adapted to it, and behavioral changes can be conducive to decreasing a vulnerability to 0. For example, we define sea-level rise as a threat because a higher water level affects communities who live close to water. To avoid the vulnerability we need to adapt for the hazard. Engagement with communities could then focus on how to adapt to the new threat to reduce their vulnerabilities.

A common element from all WG2 breakout groups is the need for shared data to fill information gaps. Currently there is no universal mechanism to treat/process the data in a uniform, standardized methods for comparison. Data accessibility and knowledge as to data acquisition would reduce redundancy and result in a cost avoidance for acquisition of future data, where the data already exists. The same applies for research initiatives; understanding networks and stakeholder priorities and current and future investments with a willingness for collaborations will accelerate discovery towards reducing shared vulnerabilities. The WG2 exercise was to identify vulnerabilities within the social, economic, and environmental framework. The results are summarized below.

a. **Social systems:** The fact that there is a lot of infrastructure in coastal regions places social systems at risk and may cause political instability, if populations and infrastructure need to be relocated. Different GoM regions will require different responses to risk. The challenge is to align local response with regional, national and international responses to ensure an overall common and shared framework. Key elements identified include the following:
   1. Coastal and inland communities: People and communities, healthcare, welfare, financial, education, food, water.
   2. Vulnerable populations (underserved = least access to resources): Indigenous populations, cultural heritage and identity, migration + climate refugees, developers/construction + its effect, disease.
   3. Native/close cultural communities (loss of local cultures and heritage/activities such as small-scale fisheries, or archeological sites/ ruins)
   4. Infrastructure: government, emergency management & response, utilities, energy, political, agricultural, real estate, religion (local - global scale); Housing, transportation, communication, insurance, land use, social inequality
   5. Workforce: skilled labor force, industry, financial, consumer staples, consumer discretionary, technology.
   6. Physical aspect: meteorology, topography.

b. **Economic systems:** Economic impacts resulting from climate forcing cross all market sectors. Combined with policy, economic impacts also can be magnified. For example, in a disaster context, policies typically invest resources in rebuilding instead of relocating structures. Key elements within the economic arena related to climate forcing include:
   1. Markets: financial, industry, technology, consumer discretionary, tourism, consumer staples, fisheries, agricultural, ranching, gross national production, trade, resources, utilities, land ownership
   2. Utilities (water supplies delivery or loss of aquifers/changes in water table levels, waste management systems-or lack thereof, energy

distribution/supply; increased cost of building utilities that can maintain the service and is passed on to consumers)

3. Transportation: ports, roads, highways (affects commerce), workforce mobility
4. Tourism: restaurants, hotels, and other recreational services, marinas.
5. Gas/oil industry
6. Insurance systems
7. Housing/residential
8. Military system (a lot of coastal infrastructure)
9. Agriculture (i.e. those that depend on aquifers that are susceptible to saltwater intrusion)
10. Intellectual proprietary information
11. Funds for research and development
12. Not every individual has the financial capacity to move from a climate disaster
13. Developers/construction
14. Real estate (can result in drop of house value)

c. **Environmental systems:** Environmental system often becomes vulnerable due to decisions/policies taken locally, as well as in other countries. For example, best practices and policies focused on upriver areas will affect down river, estuaries, and the GoM. Key ecosystem vulnerabilities include:

1. Ecosystems and ecosystem services: water, biodiversity, natural resources, health, land management, consumer staples, fisheries, aquaculture, coastal ecosystems
2. Wetlands (loss of resiliency and function/ecosystem services).
3. Shoreline (loss of beaches, waterfronts, exacerbated by weather events)
4. Coastal habitat (loss or change linked to biological and recreational value, such as decrease in birding due to bird habitat loss; species migrations or habitat use patterns, fisheries production)
5. Coral reefs (reef themselves and associated communities; recreational value and source of fisheries)
6. Geo-hydrological systems (changing patterns of groundwater flow, interaction with the level of precipitation and extraction, and interaction between aquifers and seawater, seawater intrusion)
7. Mangroves
8. Freshwater aquifers
9. Habitats, organisms
10. Water availability (freshwater) and systems in those environments
11. Loss of ecosystem services
12. Algal blooms
13. Disease vectors

iii. **Science Working Group 3:** WG3 identified the consequences of each threat, as well as a "moonshot" solution. Each priority threat also was assessed to include: key networks and stakeholders; existing data; existing technology; existing resources; and key gaps.

a. **Innovation**: For innovation, negative consequences were identified as redundancy, inoperability, and different data (because of database access). Addressing the need for enhanced innovation would lead to integrated data across fields, improved decision-making and prediction, and technology integration. A "moonshot solution" here could be to establish an entity across the GoM, without any barriers (i.e. county, private/public, academic, etc.) to improve communication and access to data.

    In a summary of resources and gap analysis, existing data were identified as raw and processed data, including real-time data (mostly in the U.S.) as well as models (atmospheric, aquatic, etc.). Gaps were identified as well, including especially a lack of communication, trust, technology, data, funds, education, algorithms, and human capacity.

    The group also highlighted key goals including: sharing data; improved quality and quantity of data; open access/source; a minimum amount of data to prevent/react to a disaster; develop new prediction tools to prevent/react to a disaster (hurricane); collaboration across institutions and countries to access and share data; prevention of theft of equipment; improve communication to understand where data are most needed; promote democratization of data processing; establish guidelines for data standardization; establish normative obligations and diffusion; establish a specific "trade" to share data/information; and protect stakeholders AND academia interests.

b. **Sea Level Rise**: This group was joined by the Water Chemistry & Pollution Group due to low participation in the water group. The results are related to sea level rise. Participants imagined the scenario of a 15cm rise by 2030 and 40cm rise by 2070. Consequences were discretely defined across environmental, social and economic systems as follows:
    1. Wetlands: Loss of resiliency and function/ecosystem services such as nutrient assimilation
    2. Shorelines: Loss of beaches, waterfronts, exacerbated by weather events
    3. Coastal habitats: Loss or change: Linked to biological and recreational value, such as decrease in birding due to bird habitat loss; species migrations or habitat use patterns, fisheries production
    4. Geo-hydrological systems: Loss of freshwater availability and decreasing quality
    5. Archeological sites: Increase cost of restoration and conservation. Loss of cultural heritage
    6. Native communities: Loss of local cultures and heritage/activities such as small-scale fisheries that suffer fragmentation due to SLR
    7. Tourism: Loss of tourism infrastructure
    8. Transportation: Loss of ports, roads, ships, highways (affects commerce), workforce mobility
    9. Housing/residential: Loss of and increased cost of housing due to design requirements

10. Insurance system: Increased insurance costs; insurance no longer available
11. Utilities: Loss of utilities (consumer services); increased cost of re-building or adapting utilities. Degradation or loss of waste management systems and energy distribution/supply.
12. Coastal agriculture: Loss of irrigation due to saltwater intrusion
13. Fisheries: Loss of fisheries production due to nursery habitat loss/degradation
14. Military facilities: Loss of coastal infrastructure

Two moonshots were identified by this group: (1) Develop a gulf-wide program to restrict development in flood risk areas, protect existing infrastructure and ecosystems, promote awareness and facilitate ecosystem and human community resilience and adaptation to SLR; and (2) Promote the creation of a Mexican Oceanographic and Coastal Agency to monitor, develop and/or advice ocean policy and provide information/data to all economic sectors (Mexican NOAA) in collaboration with other entities. If not national, then one for the GoM. Specific solutions and "transversal" cross-sector solutions also were identified for each of the systems listed above and are detailed in the workshop notes.

In a summary of resources and gap analysis, key networks were identified as: CIGOM, REMTUR, REDESCLIM, RECORECOS, UGM, CREST, AMC and N2N partners. A subset of existing data was identified primarily for Mexico, including Sistema Mareográfico Nacional (Mexico), Tidal Level Monitoring System, INEGI (topographic maps, ecosystems, socioeconomic data), CENAPRED (Centro Nacional para Prevención de Desastres), and CCA (Centro de Ciencias de la Atmósfera de la UNAM). Key gaps include: funding for assessment of local impacts, education and awareness, public infrastructure (services, transportation, waste management, protective barriers); integrated spatial analysis that considers risk of SLR (and interacting processes such as tidal level, storm surges and floods) under different scenarios; enforcement strategies; institutional shortcomings/limitations; and in Mexico, a national agency that performs assessments and advices policy. This group also identified their existing capabilities, which include:
1. Use an integrated approach to understand forecast coastal flooding, and to push for or participate in monitoring.
2. Generate gulf-wide maps with SLR/storm flooding risks and making it public (use technology and models to develop maps that indicate which areas will be susceptible to SLR).
3. Implement education and awareness programs that capitalize on network experience and capacities to minimize impacts.
4. Implement engineering solutions and designs and building codes to increase house elevation (raise houses, build additional floors, use building materials that are resistant to harsh coastal conditions, incorporating recycled materials if possible).

5. Promote regulations that prohibit development in sensitive/fragile coastal areas; further use of renewal energies (no new construction of electrical distribution systems that are lost).
6. Build levies, sea walls to protect areas considered at high risk, raise roads.
7. In the U.S., promote the need to develop, implement and enforce update regulations that prohibit development in coastal areas estimated to have a high flooding risk given a 40 cm increase over the next 50 years (data are available to make a diagnostic). Also monetize the true cost of risk (insurance) and eliminate all subsidies that allow for coastal development in high risk areas. Legislation to reduce and eliminate the subsidies over time.
8. In Mexico, promote the need to prohibit development in coastal areas estimated to have a high flooding risk given a 40 cm increase over the next 50 years. However, note that many people do not have insurance, and many coastal communities are low-income and vulnerable. Tourist facilities tend to be given permits to build in those areas due to corruption (needs to stop). Also help identify key coastal habitats that are vulnerable and in need of (complementary protection), advise the implementation and design of coastal restoration programs, and increase connectivity between networks with stakeholders and industry.

c. **Extreme Events**: The group focused on the extreme event they considered as the highest threat in the near-term, tropical cyclones. Participants identified consequences across the systems previously identified, as follows (note: in the notes, the participants also identified whether the impact would be high, medium, low):
   1. Public housing: displacement, deteriorated housing stock, incomplete recovery
   2. Homeowners: decreased property value, displacement, incomplete recovery
   3. Disruption of transportation: life loss, economic loss
   4. Infrastructure failure (water, electricity, IT, pumps, levees, facilities): life loss, economic loss
   5. Developers: build back, economic gain
   6. Construction builds back: economic gain jobs, community enhancement
   7. Public health/wellness: lack access, lack services, mental health impacts/PTSD
   8. Underserved populations: life loss (unaccounted), displaced/homeless, lack services/ access/metal health support
   9. Indigenous populations: life loss (unaccounted), displaced/replacement, lack services/ access/metal health support
   10. Community networks / integrity (social cohesion): reduced isolation, access to assistance
   11. Cultural heritage / identity: historical & meaningful places, tie to identity (need to stay/return)

12. Mitigation, preparedness, adaptation: execution (of policies w/ money), education, political will
13. Funds for disaster relief: budget, political will
14. Long-term recovery groups (that exist): budget capacity, lack of plans
15. Emergency mgmt. / first responders: budget, resources (machinery, tools, wo/man power plans
16. Oil and gas: production stops, supply chain impacts, damaged infrastructure
17. Fisheries: damaged infrastructure (vessels, processing), access to water, loss in fishing effort
18. Farming: loss of crops, increased water supply, loss of livestock
19. Tourism: loss of life (foreigners), economic loss (potentially long term, perceptions), lack of plans
20. Local economy: loss of business/jobs, partial recovery
21. Ports: closure/suspended, supply chain impacts, infrastructure damage
22. Insurance rates: displacement/priced-out, underinsured, incomplete/protracted recovery
23. Ecosystems: loss of structure, loss of function, reorganization to different system
24. Organisms: loss of life, loss of habitat, displacement
25. Water quantity: baseline water levels v. post event
26. Loss of ecosystem services: depends on habitat and service being provided, e.g., loss water quality, loss food, surge protection, etc. economic losses (ecotourism, food loss, infrastructure)
27. Sargassum impacts: distribution, economic loss
28. Algal bloom impacts: density, distribution, economic loss
29. Disease vectors impacts: density, distribution, economic loss

The group identified a number of potential moonshots, including: understanding and communicating risk and uncertainties (in preparedness, mitigation, risk mapping, education, and improving social cohesion); governance, laws and implementation / enforcement (including for policy – both risk-mitigating and risk-incentivizing, whether, where & how to rebuild, and where and how to invest in habitat protection and restoration); early warning systems/communications (if this were a part of citizen science, crowdsourcing, how you convey information, volunteer networks); infrastructure resilience; weather forecasting (private sector opportunities, e.g., final forecast depends on many models – for long-term & accurate forecast); communication systems; and education.

In a summary of resources and gap analysis, participants highlighted those "moonshot" areas where the most progress could be made, including in education, risk portfolios, risk mapping, preparedness, mitigation and social cohesion (see Table 3).

Table 3. Risk mapping, preparedness, mitigation and social cohesion

	Education	Risk Portfolios	Risk Mapping	Preparedness	Mitigation	Social Cohesion
Key Networks/Stakeholders	Community Orgs: Sea Grant, GOMA, Red Esclin, Climate Community of Practice. Leaders Link	Local gov't, state gov't; Private entities	Digital Coast	National Hurricane center, Army, Emergency Managers, State, Feds, Local, NGOs	Feds, State, Local govt's, NGOs	Churches, VOADS, NGOs, Social Media
Existing Data		USGS, HUD-CDBG, INEGI, USACE< FEMA, CENAPRED, appraisal district Census	Digital Coast, USGS	National Hurricane Center		
Existing technology	Social Networks		Digital Coast, National Water Center/National Water Model, USACE			
Existing Resources	Coastal Resilience Index	Social vulnerability index, IVC (Index for Vulnerability of Cities)	Digital Coast, Climate Resilience Toolkit, FEMA FIRMS Maps	Early warning system for tropical systems (Mexico); State & municipality warning system	FEMA, Community Rating System National Hazard Atlas	Social media
Examples	Texas target communities; Coastal Resilience Index	Streetwise-looking at local flooding	Digital Coast, TAMU flood maps LSU		FORTIFIED, elevating setbacks, buyouts	Cocorahs (community collaborative rain, hail & snow network)

The group identified the following for gaps and opportunities: education - training and capacity building (translating at local level, iterative (turnover), and in a way that's relevant); risk mapping - Parcel level risk mapping, layering data from various maps and other data sources; preparedness - Implementation (people won't leave); non-voluntary evacuation; understanding evacuation and alternatives; and social cohesion - connect informal (validated info) with command/ control structure of feds; providing an open-source portal for existing information to be deposited. The group also ranked the relevancy of these solutions to addressing the issues identified in the "consequences" discussion, across social, economic and environmental systems.

e. **Working Group 4:** The ranking of functions (Table 4), attributes (Table 5), and barriers to success (Table 6) allows for the clear identification of the vision, priories and concerns the workgroup attendees had regarding N2N GoM. These results provide input for developing the network in a focused and concerted effort.

1. Network function ranking: Results indicate that workshop attendees highly value the stewardship of knowledge, solving problems and building community. Good practices and professional development ranked low. Particular breakout groups also

identified proposing policy changes and establishing an international shared vision as important (added to the "others" category).

Table 4

Network function: three breakout groups, 11 categories Lowest possible score/highest ranking: 3 Highest possible score/lowest ranking: 33		
	Absolute ranking (summed scores)	**Relative ranking**
Identify, create, store, share, and use knowledge	5	1
Permit faster problem solving and better response time	8	2
Builds community	10	3
Connect learning to action	15	4
Spawn new ideas for products and services	19	5
Deliver an outcome	19	6
Enable accelerated learning	22	7
Increase operational efficiency	23	8
Showcase good practices	24	9
Enable professional development	26	10
Reduce the learning curve for new participants	28	11

2. Network attributes ranking: Overall results indicate that attendees consider establishing a shared vision of identify and purpose, effective engagement and connectivity and maximizing impacts to enable actions as the most desirable attributes. Particular breakout groups also identified commitment, having a clear mandate to execute, adequate representation of different sectors and planning/regular reviews of goals and timelines important, and ranked them highly.

Table 5

Network attributes: four breakout groups, 16 categories Lowest possible score/highest ranking: 4 Highest possible score/lowest ranking: 64		
Network function	**Absolute ranking (summed scores)**	**Relative ranking**
Has shared vision of the identity, purpose and work	11	1
Effective engagement and connectivity	13	2

Capacity to enable actions that maximize impact	19	3
Is built on and fosters trust	20	4
Fosters and supports collaboration for mutual benefit	24	5
Encourages peer relationships	32	6
Ownership and value recognized by all participants	32	7
Recognized and valued by the broader field	35	8
Is sustainable/enduring	37	9
Acceptance of differences	37	10
Established openness and transparency	37	11
Engagement stakeholders	42	12
Has accepted governance and administration practices	44	13
Promotes innovation and experimentation	44	14
Supports leadership and action	45	15
Ensures accountability	47	16

3. Barriers to success: Results were very clear as to the three top barriers to success: time (interpreted as the necessary investment by network participants), failing to establish a lack of vision and mission and obtaining funding (presumably for operating and sustaining the network and its goals).

Table 6

Network function: three breakout groups, 11 categories		
Lowest possible score/highest ranking: 3		
Highest possible score/lowest ranking: 33		
Network function	Absolute ranking	Relative ranking
Time	4	1
Lack of vision and mission	5	2
Funding	9	3
Operating management strategy	17	4
Technology	18	5
Communication barriers/jargon	19	6
Lack of support	22	7
Awareness of capabilities	25	8

Conflicts of interest among members	25	9
Language	25	10
Member groups appear to be exclusive	30	11

iv. **Working Group 5:** The objective of WG5 was to obtain input from all participants concerning the content of a DRAFT collaborative framework for N2N GoM. This workshop input will be integrated into the development of the N2N GoM framework following the workshop. Proposed modification by workshop participants to the initial draft include:

a. Vision: To provide solutions to current and emerging needs resulting from climate forcing and that requires a multidisciplinary and multisector approach for the GoM region

b. Purpose: Use the strength of networks to comprehensively address the economic, environmental and social consequences facing the GoM region caused by climate variability in order to provide information, leverage resources towards attaining solutions to increase resilience and adaptation of the GoM region.

c. Goals: Design and implement a multidisciplinary, international cross-sectoral, decadal strategic plan for the GoM region to find solutions to specific threats, vulnerabilities and consequences through multi-disciplinary network and stakeholder collaborations. Specifically:

1. Provide international connectivity among networks, sectors, and stakeholders
2. Establish new networks and stakeholders clusters to address specific solutions to reduce the GoM's risks associated with climate forcing
3. Identify critical problems and leverage new and existing capacities and resources for attaining shared solutions
4. Obtain and/or develop new resources for attaining shared solutions
5. Engage and provide information to decision makers in finding solutions to reduce climate driven risk (threats, vulnerabilities, consequences) at international to community levels
6. Provide a platform for increasing awareness of N2N GoM member capacities and opportunities to foster engagement and collaborations
7. Develop demonstrations projects that highlights early successes and the potential for a multinational collaborative approach
8. A structured and coordinated program of outreach to stakeholder groups that will be impacted by climate change if the Gulf of Mexico

v. Values: all members embrace N2N GoM core values. These values include the following:

a. Embrace a culture of excellence honesty, trust and respect that is inclusive of all people regardless of: age, cultural identity, gender identity or expression, nationality, physical and mental ability, political and ideological perspectives, racial and ethnic identity, religious and spiritual identity, sexual orientation, or social and economic status

b. Work with the highest level of commitment to the health and safety of our stakeholders; we treat the environment around us with respect leaving the smallest footprint possible.

c. Strive for innovation and ideas that can translate into breakthroughs and accelerate transformation

d. Cultivate a dynamic and transparent environment of collaboration

e. Each member is an ambassador for the network

f. Embrace a culture of excellence that will cultivate a dynamic and transparent environment of collaboration

vi. Resources: Develop a partnership to provide resources for the development, implementation, and sustainability of N2N GoM that can actively leverage existing and new resources through collaboration and sharing (where appropriate) of knowledge, data, expertise, facilities, etc., to increase efficiency and reduce duplication. Specific elements include:

a. Where possible leverage existing resources through sharing knowledge, data, expertise, facilities, using standard formats and procedures

b. Identify opportunity resources and engage as appropriate

c. Attain resources through a variety of venues

1. Joint multi-sectorial and/or multi-national funding proposals to state and federal agencies, private sector, and NGO's

2. Multi-sectoral partnerships & collaborations

3. Partnership with foundations and industry

4. Development of state and federal collaboration

5. Crowd sourcing, internet of thing, citizen science

6. Joint industry partnerships (JIPs)

7. N2N Foundation (potential)

8. International and multi-lateral funding sources (e.g. European Community, World Bank, IDB)

vii. Network / Stakeholder Membership: Include networks and stakeholders that share the purpose of N2N GoM and are willing to contribute or support to the success of the initiative. Specifically;

a. Are engaged in the GoM region

b. Vested interested in the impacts of climate variability in the Gulf of Mexico

c. Meet the N2N GoM broad definition of "network" or "stakeholder"

d. Lack of participation over a certain period would cause a drop in membership

viii. Organizational Governance: The N2N GoM organizational structure consists of a Steering Committee (SC), working groups (WG), Network representatives, and stakeholders. Each of these elements are described below.

a. Steering Committee

1. A SC will be responsible for building trust, credibility, effective communication, coordination, and to facilitate engagement of member networks and stakeholders

2. N2N-GoM bylaws will be drafted by the SC and ratified by N2N GoM members. The bylaws will be established by simple majority of members

3. Formal agreements and appropriate legal framework will be suggested by the WG and approved by the SC as necessary

4. A SC consisting of 15 individuals will provide coordination, development and implementation of N2N-GoM
5. The composition of the SC should be balanced by across countries, sectors and gender.
6. The initial SC will consist of the initial eight N2N GoM planning committee members. Simple majority of N2N GoM Membership will determine the remaining seven initial positions.
7. The chair and members of the SC will rotate every three years. Terms will be staggered to ensure continuity.
8. CO-Chair will be selected from the member of the SC and will replace the chair when the chair rotation is completed.
9. The SC will receive the support of an office manager/executive director as soon as funding permits.

ix. Working Groups

a. Multisector working groups (WGs) will be established to focus on developing solutions to specific threats, vulnerabilities, consequences to increase resilience and adaptation

b. Each WG will be commissioned and decommissioned by the SC.

c. Each working group will have a chair and co-chair. (Selection process and how do members get on WG. WG members will select the Chair.

d. WGs will be populated by N2N-GoM members base on a formal expression of interest to the SC

x. Network representatives:

a. Each network member has a single representative in N2N GoM

xi. Stakeholders representatives

a. Each stakeholder member has a single representative in N2N GoM

xii. Coordination:

a. SC will meet quarterly. At least one of these meetings in person each year.

b. WG will meet as necessary

c. N2N-GoM members will meet quarterly via teleconference and annually in person

d. Defining common methodologies to foster communication and clear outcomes

e. Telecommunication elements include teleconferences, phone calls, website, newsletters, and other from to engage networks and members.

xiii. Incentives

a. New and diverse collaborations attaining goals and having a greater impact

b. Increased knowledge

c. Increased efficiency and reduced cost for solutions

d. Leadership in development and implementation of solutions

e. Contribution to the development and implementation of the decadal GoM strategic plan

f. Ability to use and/or develop a multidisciplinary approach

g. Collaboration on funding opportunities with both networks and stakeholders

h. Participation in the generation of new knowledge as a result of the multi-disciplinary composition of the network

i. New and diverse collaborations and access to resources
j. Training opportunities
k. Potential access to research projects, funds and data catalog
l. Potential, access to equipment, facilities, student exchange, resources

xiv. **Case Study Outcomes:**
    a. **Pre-workshop Survey:** Results from the pre-workshop survey provided demographic information. Table 6 below provides a summary of the demographic data.

Table 7. Pre-workshop Survey Demographic Data

Demographic	No. of respondents	Response	Percentage
Nationality	46	28 USA	61%
		16 MX	35%
		2 Other	4%
Geographic Scope	46	Regional	50%
		International	20%
		Country	20%
		State	10%
Network Framework	46	Academic	60%
		Non profit	54%
		Government	37%
		For profit	5%
Number of Individuals in Existing Network	46	100-250	38%
		>1000	23%
		<100	18%
		251-500	13%
		501-1000	7%
Number of Institutions in Existing Network	46	More than 30	46%
		11-30	34%
		6-10	10%
		Does not apply	10%
Network meetings	46	Yearly	40%
		Other	28%
		Quarterly	17%
		monthly	10%
		> 1 per	5%
Network primary domain	46	Environment	
		Research	
		Outreach	
		Academic	
Network Collaboration	46	Yes	84%
		No	16%

with other Networks			
Respondent Relationship to Network	46	Participant	90%
		Leader	10%
Respondent involvement with Network	46	Over 5 years	65%
		3 - 5 years	20%
		< 3 years	15%
Network funding projects	46	Yes	53%
		No	47%

b. *Top Concerns for Information Sharing with other Networks:* We asked respondents about their top concerns for information sharing with other networks. Their top three concerns included "transparency about how information will be used", "benefits for sharing network information are made explicit at the start", and "Options to combine information shared from different networks to ensure own network gets useful solutions and benefits". Table 7 below provides a summary of respondents' answers.

Table 8. *Top Concerns for Information Sharing with other Networks*

Rank	Concern	Mean
1	Transparency about how information will be used	4.11
2	Benefits for sharing network information are made explicit at the start	3.92
3	Options to combine information shared from different networks to ensure own network gets useful solutions and benefits	3.85
4	Clear link between information shared and benefits provided	3.82
5	Flexible privacy policy to allow networks to control types and amount of information they wish to share	3.43

c. *Network Focus:* We asked respondents about their network's focus. The top responses included "generating new knowledge", "contributing to decision making at different levels", and "generating innovative ideas". Table 8 below provides a summary of the respondents' answers.

Table 9. *Networks' Focus*

Rank	Focus	Mean
1	Generating new knowledge	4.40
2	Contributing to decision making at different levels	4.35
3	Generating innovative ideas	4.25
4	Addressing important societal problems	4.18
5	Utilizing new technology	3.95

6	Generating revenue	2.58

    d. ***Network Top Challenges:*** We wanted to learn more about challenges that face networks. We asked respondents to rank order their networks' top challenges. The challenges are presented in Table 9 from highest to lowest.

Table 10. *Networks' Top Challenges*

Rank	Challenge
1	Sharing Data
2	Community Resilience
3	Joint Research/Multidisciplinary Collaboration
4	Influence Public Policy
5	Discuss Climate Change
6	Dissemination of Information

    e. ***Network Best Practices:*** We then asked respondents to provide us their perspectives on what their networks' were best at. The top responses included "convening, bringing together different individuals or groups", "amplifying, capitalizing on existing knowledge", and "learning and facilitation, helping to work more efficiently and effectively". A summary of the ranked responses is provided in Table 10 below.

Table 11. *Network is Best at*

Rank	Network is best at
1	Convening (bringing together different individuals or groups)
2	Amplifying (capitalizing on existing knowledge)
3	Learning and facilitating (helping to work more efficiently and effectively)
4	Filtering (organizing and managing important information)
5	Community-building (promoting and sustaining values and standards)
6	Investing and providing (offering a means to give members the resources they need)

    f. ***Factors Limiting Network Effectiveness****:* We asked respondents about the factors that limit the effectiveness of their network. The top three responses included "funding", "time", and "technology. A summary of the limiting factors are summarized in Table 11 below.

Table12. *Factors Limiting Network Effectiveness:*

Rank	Factor
1	Funding (34%)
2	Time (25%)
3	Technology (8%)
4	Operating management strategy (8%)

5	Communication barriers/jargon (6%)
6	Conflicts of interest among members (6%)

    g. ***Network Success Factors:*** We asked respondents on the factors their networks depend on for success. The main factors that respondents suggest included: "Adopting a consistent attitude to collaboration and knowledge sharing", "raising the strategic relevance of the network in a specific sector", and "building trust, rapport, and a sense of community". A summary of the responses is provided in Table 12.

Table 13. *Network Success Factors*

Rank	Success Factor
1	Adopting a consistent attitude to collaboration and knowledge sharing (25%)
2	Raising the strategic relevance of the network in a specific sector (25%)
3	Building trust, rapport and a sense of community (15%)
4	Securing sufficient funding to achieve network goals (15%)
5	Delivering an outcome (10%)
6	Involving experts in their sectors (10%)

    h. ***Technology Platform Networks Use:*** We asked the network respondents to provide us with information about the technological platforms they use. Several platforms were named including the following:
1. WhatsApp/Videoconferencing
2. Zoom/Youtube/Webex
3. Coastal Resilience online web mapping tool
4. Information management through the Environmental Data Initiative (EDI) and PASTA
5. One respondent provided us with the following answer: *"My network is challenged by lack of investment in common systems that would enable us to function in a more streamlined manner and consistently".*

    i. ***Technological Gaps that Hinder Networks:*** We asked another open ended question about technological gaps that hinder Networks. Respondents provided the following list of gaps.
1. Poor Communication (especially in Cuba)
2. Lack of common systems/platforms used for our day-to-day work
3. Dissemination of Information
4. Data Management
5. Funding/Money

    j. ***How N2N Collaboration Helps Networks:*** In our last question, we asked respondents how they think the N2N collaboration helps networks.

Respondents provided several responses that are summarized in the list below.

1. More Shared Information/Increased Data Exchange
2. Synergy between the networks to achieve a deeper knowledge and understanding of the large system of the Gulf of Mexico
3. Improve knowledge resources and community connections
4. Always strength in numbers
5. Anything that promotes a one Gulf strategy is a good one

k. **Focus Groups:** We conducted two focus group sessions with open ended questions. Findings from the FGs provided the research team with participants' reflections in action". These findings are summarized in the following section.

l. *On the Workshop Overall Objectives:* We asked the focus group participants to provide their reflection on the workshop overall objectives. The discussion among the FGs resulted in the following themes.
   1. Ability to bring together individuals from different disciplines with different points of view.
   2. Good format for holistic view and for such level of engagement
   3. The small group (WG1/WG2/WG3) structure helped with engagement
   4. There is balance with USA/Mexico participation
   5. Well designed with a balance of plenary and break outs and the time was enough to get some satisfying output
   6. Balance between having enough time so people think deeply in small groups and then work together as a whole

m. *Workshop Future Success Factors:* We also wanted to learn from the respondents about the content of the workshop and what factors discussed in the workshop that help with imagining a better future. The FGs provided the following responses.
   1. A lot of networks are trying to collaborate, but what is nice to see here is to get the ideas together
   2. One suggestion is maybe a 5 minute poster/presentation/summary online to highlight what we discussed
   3. Would be nice to get a network map of the present networks. Having a sense of who is behind the individual in their network!
   4. A lot of networks are dysfunctional and I see some hope through the connections at N2N and what will come next!
   5. A network for the sake of network is not enough, Networks crystalize around a cause.
   6. The aim here to find a common vision and purpose is important, and when the topic is big the process is very complex.

7. Many important topics were presented today and we might lose focus if we do not have a clear view for what the ultimate goal is

n. ***Workshop Highlights:*** Another question we asked our FGs was what they thought were highlights from the workshop. Respondents provided the following answers.
   1. Overall organization
   2. Facilitation was important in getting outputs that were critical
   3. The overall presentation of the workshop, maybe we do not agree with the threats but the productivity and engagement were very high
   4. A success was this WG2. The participants in the workgroup decided to be together based on mutual interest/threat. Unlike WG1 (Day 1 morning), in WG2 we knew we could provide information and be productive. We became a team!
   5. Not everyone agrees on the format or the model, but that does not stop the process. It is important that thinks were acknowledged and not dismissed.
   6. The facilitation of the discussion was very effective and without that we could not reach the results.
   7. Keynote Speakers
   8. Keynote speaker going over the Gulf of Mexico and present models with similar threats
   9. Keynote speaker with the photo of his grandchildren.
   10. The panel discussion was a revealing moment.
   11. Size, 40-50 participants is a good number. Also, small groups are excellent.
   12. The realization that we share some common problems, on both sides of the boarder. We need to understand how the systems work.
   13. Coffee non-stop

o. ***What Would You do Differently?*** We asked participants about what would they do differently. They provided a list of suggestions that are listed below.
   1. For such a project one would wonder: Do you invite everyone or do you invite a small group?
   2. For the purpose of this workshop, we do not have all expertise/sectors present and some elements are missing, but the folks here have a diversity of expertise.
   3. Small steps of success, that is when you bring in the local communities. But do not invite local communities at this point.
   4. Also invite politicians and decision makers at a certain point, but they would not add to this initiative right now.

5. Be targeted and strategic with the time reporting results in the big group. Identify the redundancy and provide summaries is more effective
6. Good discussion, but what was discussed about vulnerability is too short. A common framework would be better.
7. The purpose as I understand it, is mainly focus on shared priorities but I feel more comfortable if you provide us with a specific problem!
8. Get input sometime in the future from the communities and engage them with understanding the threats and vulnerabilities.
9. Get out of our comfort zone
10. Local communities can provide other variables

p. **Exit Survey Results**
The exit survey results provided "reflections on action" from the workshop participants. The following section provides a summary of these findings.

q. *Workshop Content:* We asked respondents about their perspectives on the workshop content. Majority of respondents either "agreed" or "strongly agreed" that the workshop lived up to their expectations and that the content was relevant to their networks. Table 13 below provides a summary of respondents' answers.

Table 14. Workshop Content

Content	Mean
This workshop lived up to my expectations.	4.48
The content is relevant to my Network	4.38
I was well informed about the objectives of this workshop	3.96

r. *Workshop Design:* We asked respondents about their perspectives on the workshop design. Majority of respondents either "agreed" or "strongly agreed" that the workshop activities stimulated their learning and gave them important information to take back to their network. Table 14 below provides a summary of respondents' answers.

Table 15. Workshop Design

Design	Mean
The workshop activities stimulated my learning	4.44
The workshop activities gave me important information to bring back to my Network	4.37
The workshop activities strengthen collaboration between my network and other networks	4.22
Difficulty level of this workshop was appropriate.	4.10
The workshop objectives were clear to me	4.07

The pace of this workshop was appropriate.	3.63

s. *Interest in Continuing Participation in Future N2N Collaborations:* Probably the most telling response to the success of the workshop was the question we asked participants about whether they would be interested in continuing their participation in the Network-to-Network initiative moving forward? 26 respondents provided answers and all answers were in the affirmative "Yes" (100%).

t. **PC exit survey results:** A survey was presented to the planning committee post workshop to glean from each member their overall impressions of the workshop and project. The results are included below. The survey consisted of 10 questions. The results are presented below.

Table 16: On a scale from 1 (disagree) to 5 (agree)

		Mean
1	The planning process was effective:	4.5
2	The implementation process was effective:	5
3	The workshop achieved its purpose:	5
4	Members of the planning committee were effective:	5
5	Members of the support team were effective:	5

1. Please identify the lessons learned from the planning and implementation of the workshop.

   a. Invites were the most difficult issue to deal with. We should have moved on past those that remained "interested" for months much more quickly to Tiers II & III and even further if necessary. The "right" players were those that wanted to be there, within the bounds of the network and topical approach. Had we moved past invites sooner, I believe we could've worked out more specifics on the workshop methodology prior to the workshop, which would have benefited us all (and in a sense was needed)

   b. As in-person meetings of the planning team was not possible, video chatting was important. For me, it helped build team camaraderie

   c. Though we were all exhausted and had other matters to attend to, we probably should've convened sooner to capture initial lessons learned, reporting, etc.

   d. The lessons learned by the planning team are so valuable. From the start there was a buy-in to the project. Although we were from

different disciplines, cultures, with different interests we came together (took us a few months) and agreed on the conceptual framework, and brought our knowledge and skills and fit them into the framework. We learned from and with each other from the planning phase to the design phase, up to the implementation phase, and the more we worked together the better we became at understanding what we wanted to do and that was a main reason for the success of the project

e. Leadership was critical in every phase of the process. Jack put on several hats, sometimes he acted as a manager, other times he was a translator, facilitator, knowledge broker, but most importantly he trusted his team members and delegated important parts of the project to the team. Supporting cast was important as well.

f. All the above led to establish a trust relationship with the participants, and that is why all this preparation resulted in high levels of dialogues. All participants were actively engaged for the full workshop.

2. What were the failures?
   a. The invites and the workshop methodology process. We were still struggling with invites in the two weeks directly prior to the event. This was distracting and stressful at best, and at worst I think this caused us to make little progress on the workshop methodology and the process for that methodology. On the workshop methodology process, we all had sent out our ideas and instructions for our assigned breakout groups prior to the event, but no one had a good idea of how the breakout groups actually would be run. As a result, we had the one day directly before the event to go through everything, and as it happened there were actually disagreements on the methodology and process. However, it was too late to rectify those disagreements.
   b. There were no failures. My answer would be more about challenges. Some of the challenges included having invitees commit to participate in the workshop. Within the team, work style and cultural differences constituted another challenge.
   c. Translation of ideas among different disciplines was a challenge. It took us (the team) more than two hours to come up with two definitions (one on what is a network?, and the other was related to opportunities vs. priorities vs. challenges. Vs threats…)

3. What were the successes?
   a. Though I had trouble with the process, I do think ultimately it was successful. The participants, I found, appreciated the working process we led them through, which derived very useful and structured content in short order. Further, not only were the workshop

objectives obtained, but the relationships and buy-in for N2N was significant. I have never been to a workshop where at the end of three long, intense days nearly all participants were still present and thoroughly engaged – there were excited and joining the conversation and very few were looking at phones, computers etc. It was enthralling!

    b. One of the major successes was the change of the research members (the planning group) to becoming one team.

    c. Another success items are the products of the project including: the Networks' list, the pre-workshop survey; the workshop framework and content, as well as the Workshop outcomes

4. What, if any changes would you make?
   a. Ideally, we would have done a dry run of the breakout groups – in-person – weeks before the event. At the least, we should've done a dry run over Skype. In this way, differences in methodology and style (perhaps even more importantly) would have become clear and we could've taken measures to address them.

   b. Candidly, I also take issue with the strictness of methodology in general when working in groups. While I recognize the process must be robust, defensible, and must produce similar results across varied breakout groups, each group and each lead is different and should be trusted to produce valuable results that are within the workshop framework but perhaps are derived in different ways. Perhaps more training on participatory exercises, facilitation and the sociology of group work would be beneficial.

   c. A the macro level, try have more sectors represented in the workshop (I know we tried our best…maybe more incentives, other strategies, different time of the year, something to attract leaders from other networks to participate in the workshop!)

   d. At the micro level, some minor tweaks to the workshop such as information/directions provided to participants, role of note takers, pre-workshop results posters…) for next time, I am sure we would be better prepared.

5. Other?
   a. Thank you so much for a transformational experience and for your leadership.
   b. For me, the greatest takeaway is the potential of N2N by and large due to the "family" that steers the ship. I have been involved with

many, many efforts that at first glance seem similar to N2N. However, in engaging in the effort over the last year, I see clearly that N2N is unique. It is unique in its vision, goals, participants, approach and in its team. It is unique in its potential to change the nature of collaboration in the Gulf. I believe it can and will do what so many of us have sought – to understand, merge, leverage and apply our many unique capacities and resources on behalf of Gulf of Mexico adaptation and resilience.

8) Impact

8a) Impact on principle disciplines:

N2N GoM facilitated collaborative research across scientists, stakeholders and decision-makers. It established grounded, critical research priorities that link natural and social sciences with policy and technology that, once developed, will enable better understanding of the complexity of GOM systems in real-time to decadal varying climate.

8b) Impact on other disciplines:

The produced research agenda was developed with cross-sectoral, interdisciplinary and international risk-based experts, and integrated research teams that transcend traditional boundaries that have already been developed. Further, the workshop process was a critical key step in the development of knowledge "co-production," whereby institutions and researchers across disciplines deepen collaboration in initial research stages of problem formation and in considering the feedbacks and linkages that occur within and across issues. From there, participants were better able to consider solutions that address linkages and are able to meet multiple societal objectives. Particularly by advancing deep collaboration with decision-makers at the outset, N2N advanced early identification of interdependencies across the complex societal challenges under consideration. The overall impact extends through STEM, nonSTEM and market sectors including (consumers (discretionary) consumers (staples), communication services, energy, financials, healthcare, industrial, information technology, materials, real estate, and utilities).

8c) Impact on the development of human resources

N2N GoM engaged student volunteers from the local universities to assist in note taking during workshop breakout sessions. Although their primary effort was focused on documenting the discussions, each student was encouraged to participate and contribute to the scientific discussion. The student engagement worked so well that one breakout session elected for the student to present the breakout results to the at-large group. Students were also encourage to network with workshop participates during breaks, as well as during dinners. This engagement provide students to both understand and contribute to scientific inquirer and strategies to advance science. In addition, it provided students the opportunity to discuss their science and practice their English during this multinational meeting.

8d) Impact on physical resources that form infrastructure

Not applicable for phase 1. Will be an important element for the later portion of N2N GoM Phase 2 and al of Phase 3.

8e) Impact on institutional resources that form infrastructure

Significant institutional resources were required to augment NSF funding in order to deliver a successful phase 1 program. The types of resources necessary included personnel time (Faculty & staff) in support of the workshop and development of the website.

8f) Impact on information resources that form infrastructure

N2N GoM Phase 1 focused on developing connectivity with identified networks and stakeholders. The mechanisms for communication included; email, conference calls, phone calls and websites. Routine pre-workshop and post workshop engagement focused on email. Workshop communication focused on web access. Web site design and maintenance is the one ongoing element impacting information resource infrastructure. Demands on this and other information resources will increase significantly in N2N GoM phase 2 and 3.

8g) Impact on technology transfer: N2N GoM Phase 1 had little impact on technology transfer. Given that this was the preliminary phase of data gathers, identification of who's who and just understanding the initial capacity for some of the networks. Further development…

8h) Impact on society beyond science and technology

A fundamental N2N GoM objective is to develop a strategic approach towards providing solutions to climate forcing which impacts the GoM region. Developing new communities from existing networks and stakeholders will provide the opportunity to leverage existing network resources (knowledge, capacities, affiliations, funds, etc.) to attain solutions. N2N GoM Phase 1 focus is on initial network identification and development.

8i) Dissemination of results to the community of interest

The N2N GoM team is committed to promulgating the results, best practices and lessons learned to the community at large through presentations and publications. The initial workshop results and the general elements of N2N GOM are available on the website, n2ngom.net. The website will continue to be enhanced during future phases of this program One presentation of the N2N GoM project lessons learned took place at the National Science Foundation (NSF) 2019 AccelNet Project Kick-Off Meeting, the 28-29 October 2019 at the request of the NSF. An abstract will be submitted for oral presentation at the International Science of Team Science Conference 1-4 June 2020, Durham, North Carolina. A manuscript will be submitted to the Learning Organization; Special issue focused on lessons learned from dimensions of a Learning Organization Questionnaire Studies. First draft required 30 December 2019. Additional publications focused on presenting the methodology, as well as the scientific results are currently being planned.

8J) Products

N2N advanced a framework for engagement in establishing an interdisciplinary, co-produced and binational research agenda. Mechanisms are needed to support collaborative research

and to develop a culture of timely problem solving. N2N offers and engagement process for the early stages of collaboration, which is necessary to build trust and buy-in that is essential to the usability of research findings and outputs. Institutional leadership and researchers fostered and are maintaining dialogue across stakeholder groups (government, private, and public), which will further help refine research solutions but also approaches to succinctly describe the impact and broader applicability of their work. Both are essential to developing a common platform of communication and shared understanding. The methodology developed and successfully executed by the N2N Planning Committee is transferable to and potentially scalable for the broader community.

9) Changes that have a significant impact on expenditures

There were several significant changes to the project implementation when comparing the initial concept and proposed methodology to the final implementation. Each of these are discussed below.

i.   Workshop duration: The workshop duration was reduced from 4-days to 3-days to maximize the opportunity to garner participation. Initial feedback indicated that time demands would reduce participation from market sector representatives. The consequences of this decision was a more compacted and ambitious agenda at the expense of social activities.

ii.   Steering Committee; the initial concept was to establish a N2N GoM steering Committee. The purpose of this committee was to provide input into the implementation strategy, as well as to increase the national and international visibility of this program. The PC spent some effort on developing this concept and reaching out to individuals. However, the cost associated with attaining engagement with the level of person identified in addition to schedule resulted in abandonment of this approach. The consequences of this decision reduce somewhat the visibility of the program in the short term, but it is envisioned that one can capitalize on this during the implementation phase of the next step.

iii.   TED-like Talks by an invited speaker: Although Ted Talks were not part of the proposal. The PC discussed the possibility of this approach to broaden the mindset of participants to allow them to think on a more global scale. The PC explored specific individuals but the budget and timelines disallowed further pursuit of this potential strategy. The concept of Ted Talks was replaced by hosting two keynote speakers and a panel discussion. Consequences was a much richer local workshop environment that focused the discussion and outcomes at a reduced cost.

iv.   Broadcast of plenary: Initial thoughts were to reach a broader audience by broadcasting the plenary sessions. The PC abandoned this concept given the complexity of attaining this and the transition to a three day condensed agenda. Consequences. Improved efficiency of the meeting at the expense of broader participation.

v.   Press Conference: Although not part of the NSF funding the PC explore the potential for hosting a pre and post press conference to elevate the National and international visibility of N2N GoM. The PC elected to release a local press release prior to the workshop and to invite the press to the workshop rather than hold a formal press

conference. A post workshop press conference will be considered once the results have been synthesis. Consequences. Provides for a more comprehensive outreach discussion including next steps rather than a weaker content engagement.

    vi. <u>Speaker "Check your hat at the door"</u>: The PC discuss the need to provide a motivational speaker to bring the participants together and to provide coaching as to the usefulness of networks and network development. The PC explore several possible individuals with skills in networking weaving and team building. After review of the possibilities and overall estimated costs, the PC elected to take the responsibility of this effort on by itself.

    vii. <u>Changes that have a significant impact on expenditures</u>:

        a. 4 days to 3 days: Adjustment of the duration of the workshop from 4 days to 3 days resulted in a cost avoidance of hotels and meals for one day.

        b. Hurricane insurance: The hurricane season for the Gulf of Mexico occurs from 1 June to 30 November with the peak season occurring in the August through October window. Hurricane insurance was obtains for N2N GoM, using non NSF funding to ensure the recovery of costs related to travel (airfare, hotels and meals) in case an incident caused disruption of the workshop. The PC decided to make this investment to ensure that the resources necessary to deliver the workshop would be preserved in case of a natural event outside of the PC control.

10) Lessons learned

    i. Workshop vs conference; The PC spent significant time discussing the relative merit on the type of meeting concept. Critical to the success of the workshop is trying to determine the proper composition, number of participants and balance between network representatives and stakeholder representatives while maintaining a balance in U.S. and Mexico representation. The PC wanted to maximize participation but balance it in attaining the overall goals. The initial strategy was to target participation of about 26 individuals then combined with the PC and others for a total of about 40-50 Individuals. During the planning discussion, there were opportunities to increase that number targeting closer to 60-70 participants. There was enthusiasm by the PC to grow this number to increase representation and expertise at the workshop. However, in the end the PC elected to stay with the smaller workshop concept. This decision was based on several drivers including, workshop effectiveness, having an ideal size of 4-8 participants in each breakout and a limited of on-average five breakout groups, and cost. Post workshop assessment would suggest that the target of about 40 individuals was effective and efficient for this particular workshop. The break out groups of about 8 participants each was well received by the participants.

    ii. Cultural differences: The multinational focus of this workshop required careful consideration of cultural difference among all contributors and participants. Cultural awareness is necessary even if this was not a multinational program; however, that multinational facet dictates that cultural awareness was a high priority. Several elements are worth mentioning

iii. Definitions: given the rich cultural, heritage and expertise, it was critical to define concepts and terms carefully and well defined to ensure each individuals understood the point of discussion.

iv. Work style: the PC took a change in introducing the concept of a "working lunch" into the agenda, as well as to minimize social excursions. These decisions by the PC in part were part of the trade off when going from a 4-day to 3-day workshop. In general, the participants accepted both approaches, however, this was atypical for workshop in Yucatan. In general, some participants would have appreciate more social time for one on one discussion.

v. Communications: The multinational nature of the workshop required that the PC ensure effective communications. To do so all communications were in both English and Spanish although both versions were not always transmitted to each individual. The workshop designated English as the official language for the workshop and provided real time Spanish-English translation services as necessary. Note that these services were discontinued midway through the workshop given the lack of need.

vi. Politics: Several political events occurred during the planning process for the N2N GoM workshop. These were the hardening by the U.S. on immigration policy and Federal and State elections in Mexico.

   a. General elections in Mexico: In July 2018, the citizens of Mexico elected a new government resulting in a change of leadership to the Movimiento Regeneración Nacional (MORENA) party. The new leadership occurred at the Federal level as well as at the State of Yucatan level. This leadership change at multiple levels introduce uncertainty into all sectors in Mexico. Specific to N2N GoM it introduced uncurtaining in funding from the State of Yucatan as partial sponsors of this program. Note that there is no mitigation for this concerning future planning strategies.

   b. CONACYT: leadership change, a change in leadership and a redirection of priorities resulted in minimal engagement in CONACYT concerning N2N GoM. The original concept was to use the workshop and planning effort to strengthen ties with CONACY. This did not happen given administrative changes, but it is now designated as a post workshop priority.

   c. US Policies: The change in US immigration policy and enforcement during the planning of the N2N GoM workshop had an indirect impact. In general, all participants realized that the politics were at the national level and were able to work at the local level to progress on N2N GoM. However, concern regarding potential longer-term impacts remains, particularly with regard to develop binational programs and agreements that require government participation.

   d. Cuba: The current program focused on building this program between the US and Mexico. To establish a comprehensive agenda of the GoM will require at some point in the future engagement with Cuba.

11) Next Steps: Continuity of "Network of Networks"

The initial phase in the establishment of N2N GoM is focused on alignment of existing networks, developing synergies through appropriate conduits, as well as the identification of common scientific and technological priorities. This is the critical step in the development of a successful

'Network of Networks', however, further advances can be attained through the development of a strategic roadmap that integrates common priorities and leverages resources to advance research on how climate variability will impact the GoM region. Two key elements are required to advance N2N GoM. The first is continued advancement in advancing the science. The second element is continued development of the network. Each of these categories are described further below.

i. <u>Scientific Advancement:</u> Development of the solution driven multinational, cross-sectorial decadal agenda requires the comprehensive mapping of the threats, vulnerabilities, and consequences resulting from climate forcing within the GoM region. This mapping will result in a mosaic that reflects the interrelationship of cause and effect from climate force risks in the GoM. Overlaying the existing GoM network's and stakeholders onto these mosaics will allow the identification of Network/Stakeholder clusters focused on shared priorities and/or common interest. Solutions to address high priority vulnerabilities will be identified and resources attained to attain critical solutions using this sub-cluster approach.

ii. <u>Network Framework:</u> Network development needs to build on the success and momentum of the workshop. Key steps include the following:

a. Establish steering committee: The SC, which represents the N2N GoM member's needs to be established to provide the leadership connectivity, and implementation strategy for N2N GoM. The SC will be responsible for establishing by-laws, solidifying membership, leverage existing, establish new funding sources, providing the communication connectivity and developing the strategic approach to establish the GoM multinational decadal agenda for the.

b. Solidify Membership: Participants to identify GoM networks & stakeholders to determine overall membership.

c. Establish N2n GoM bylaws: Develop by laws that are ratified by the N2N GoM membership.

d. Leverage Capacity: Several key steps include (a) develop System Mosaic. (b) Refine and cross thread threats with <u>multiple</u> vulnerabilities based on workshop and additional input; (c) Map network & stakeholders to mosaic and identify network pods for common threats and vulnerabilities; (d) Identify N2N GoM capacity and (e) Diversify network pod participants to diversity knowledge and capacity.

e. Establish existing and new funding sources: Key steps include (a) Identify quick wins, (b) Submit N2N GoM phase 2 NSF proposal (2020), (c) Align efforts with Agencies, state, federal sectors, and foundations, etc.; an (d) Develop NSF – CONACYT and other proposal targeting solutions as well as long term sustainability of the program

f. Publications: Completion of several publications including; (a) Complete NSF / Yucatan N2N GoM Project Report; (b) Complete N2N-GoM case study Phase 1 manuscript; (c) Develop PR package, press release etc.; (d) Complete initial summary on threats, vulnerabilities and consequences based on workshop and post workshop input.

g. Decadal agenda Expand initial elements of threats, vulnerabilities, consequences and possible solutions

This effort concentrated on the methodology to build a new community from the more than 181 diverse networks identified in the GoM with numerous stakeholders to reach alignment in priorities and action plans. The initial case study documented the methodology for this integration given the magnitude of the undertaking as a template for future initiatives. The effort focused on the identification of networks, engagement with these networks and the design and implementation of a workshop to bring network and stakeholder representatives together to commence the identification of the value of N2N GoM, establish a common vision and to establish a framework on which to build and to provide lesson learned. Critical to this effort was obtaining a clear understanding as to the values, needs and attributes of a successful network from each networks' perspective. In order to better, frame the framework for N2N. Having framed N2N GoM, the next phase of the case study is to document the implementation phase of N2N specifically the process of transition from the vision and initial concept to development of the network to the point of establishment of a stabilized and sustainable network. Phase 2 of the case study is the documentation of the methodologies and lessons learned as a continuation of the initial effort.

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Appendix A
Pre-Workshop Survey

The Network to Network (N2N) Collaboration Planning Committee is conducting a survey of approximately 200 networks that depend on the ecosystem services provided by the Gulf of Mexico (GOM) in terms of health, social well-being, governance or economic activity. The objectives of this survey are to prioritize common challenges resulting from climate variability in the GOM. A network for this purpose is defined as two or more entities actively working toward a shared vision and/or mission.

Your participation in this survey will provide a better understanding concerning the purpose and functionality of the variety of networks within GOM. Survey results will also help with:
   (a) engagement with other networks with common interests
   (b) future development of strategies to more effectively attain specific network objectives

Benefits of your networks' contribution to this survey include: obtaining a summary of binational and multi-sectoral prioritized challenges and possible solutions, increased knowledge, and potential engagement with other networks. This survey will take about 20 minutes and all information gathered will be summarized, not attributed to any individual network, and will be shared with you along with subsequent reports.

I am happy to discuss this further with you as needed. I can be reached at the email address: j-baldauf1@tamu.edu or by phone: (979) 845-8585.

Thank you.

Jack Baldauf

Section I: In this section we ask demographic questions related to your network.
Please provide detailed demographic information about your network by answering the following items.
   1- What do you consider your geographic scope?
        ○ local
        ○ city
        ○ county
        ○ state
        ○ regional (please specify your region)
        ○ country
        ○ international_

        _____
   2- What is your network's framework? Please select all that apply
        ○ Non-profit
        ○ For profit
        ○ Government
        ○ Academic

○ Charity
○ Other (please specify) -----------

3- If you establish a collaborative relationship with other networks that imply sharing of information, how important are each of the following to your network?

	12) Not important	13) Slightly important	14) Neutral	15) Moderately important	16) Very important
A- a flexible privacy policy that allows me to control the types and amounts of information I wish to share	☐	☐	☐	☐	☐
B- transparency about how my information will be used	☐	☐	☐	☐	☐
C- the link between the information I share and the benefits provided are clear	☐	☐	☐	☐	☐
D- benefits for sharing my network information are made explicit at the start	☐	☐	☐	☐	☐
E- options to combine information from several networks to	☐	☐	☐	☐	☐

ensure my network gets useful solutions and benefits					

4- To what extent does your network focus on:

	Never	Rarely	Occasionally	Very frequently	Always
A- Generating innovative ideas	☐	☐	☐	☐	☐
B- Generating new knowledge	☐	☐	☐	☐	☐
C- Utilizing new technologies	☐	☐	☐	☐	☐
D- Addressing important societal problems	☐	☐	☐	☐	☐
E- Contributing to decision making at the local, regional, state, or national levels	☐	☐	☐	☐	☐
F- Generating revenue	☐	☐	☐	☐	☐

5- What is the number of member institutions in your network?
- ○ 1-5
- ○ 6-10
- ○ 11-30
- ○ More than 30
- ○ Does not apply to this network

6- What is the number of individuals in your network?
- ○ 1-25
- ○ 26-100
- ○ 101-250
- ○ 251-500
- ○ 501-1000
- ○ More than 1000

7- What is your network's top three challenges:
- 1- _____
- 2- _____
- 3- _____

8- How often do you meet as a network?
- ○ More than once per month
- ○ monthly

- ○ quarterly
- ○ yearly
- ○ other (please specify) _____

9- Your network is best at (select all that apply):
- ○ filtering (organizing and managing important information)
- ○ amplifying (capitalizing on existing knowledge)
- ○ investing and providing (offering a means to give members the resources they need)
- ○ convening (bringing together different individuals or groups)
- ○ community-building (promoting and sustaining values and standards)
- ○ learning and facilitating (helping to work more efficiently and effectively)

10- Please rank the top primary/major domains in which your network is most active? (Select all that apply)

Primary/major	
○ Agriculture	1-
○ Economy/Commerce	2-
○ Education	3-
○ Energy	4-
○ Environment	5-
○ Health	6-
○ Industrial	7-
○ Information Technology	8-
○ Materials	9-
○ Outreach	10-
○ Recreation	11-
○ Re-insurance	12-
○ Research	13-
○ Security	14-
○ Tourism	15-
○ Transportation	16-
○ Utilities	17-
○ Others, please specify: _____	18-

11- What types of interdisciplinary expertise does your network bring to the ranked domains

_____

_____

_____

12- Does your network collaborate with other networks?

○ Yes
○ No

13- if "Yes", which are those networks?

_____

_____

14- Please identify other networks that depend on or interact with the Gulf of Mexico that you think should also be included in the Network-to-Network initiative.

_____

_____

15- What describes you best with respect to your network?
　　　○ I have a particular leadership role or function in the network
　　　○ My primary role is a participant in activities and events organized by my network
　　　○ Others, please specify: _____

16- How long have you been involved in your network?
　　　○ Less than 1 year
　　　○ 1 - 2 years
　　　○ 3 - 5 years
　　　○ Over 5 years

17- Section II: Network self-assessment
For the following questions, please provide the degree to which you agree or disagree with the statement about your network.

My Network:	strongly disagree	disagree	neutral	agree	strongly agree
18- helps me build professional relationships with others	☐	☐	☐	☐	☐
19- is mainly driven by the willingness of members to participate in networking activities	☐	☐	☐	☐	☐
20- motivates me to contribute to the network	☐	☐	☐	☐	☐
21- breaks down communication barriers among members	☐	☐	☐	☐	☐
22- has a user-friendly communication platform	☐	☐	☐	☐	☐
23- helps me achieve better results in my organization	☐	☐	☐	☐	☐

24- helps me achieve better results in regional/country level partnerships	☐	☐	☐	☐	☐
25. helps me achieve better results with strategy/policy work	☐	☐	☐	☐	☐
26- captures/stores knowledge that is usually difficult to transmit/describe in written or verbal forms	☐	☐	☐	☐	☐
27- captures/stores formal knowledge that is usually easy to transmit/describe in written or verbal forms	☐	☐	☐	☐	☐
28- strengthens collaboration between my network and other networks	☐	☐	☐	☐	☐
29- my network promotes learning	☐	☐	☐	☐	☐
30- my network encourages members to build trust with each other	☐	☐	☐	☐	☐
31- my network encourages teams to revise their thinking as a result of group discussions or information collected	☐	☐	☐	☐	☐
32- my network makes lessons learned available to all members	☐	☐	☐	☐	☐
33- my network recognizes members for taking initiative	☐	☐	☐	☐	☐
34- my network works together with the outside community to meet mutual needs	☐	☐	☐	☐	☐
35- my network encourages leaders to continually engage in learning opportunities	☐	☐	☐	☐	☐

18- The success of your network depends on (select all that apply):
- ○ raising the strategic relevance of the network in a specific sector
- ○ involving experts in their sectors
- ○ specifying members' roles and expectations
- ○ being inspired by a dedicated and passionate coordinator
- ○ adopting a consistent attitude to collaboration and knowledge sharing
- ○ encouraging new members to participate
- ○ recognizing and rewarding new members
- ○ building trust, rapport, and a sense of community
- ○ deliver an outcome
- ○ securing sufficient funding to achieve network goals
- ○ positioning within the sector of interest

19- What limits your network effectiveness? (select all that apply)
- ○ Time
- ○ Funding
- ○ Technology
- ○ Operating management strategy
- ○ Awareness of capabilities
- ○ Lack of support
- ○ Communication barriers/jargon
- ○ Member groups appear to be exclusive

○ Conflicts of interest among members
○ Language
○ Lack of vision and mission
○ Others, please specify: _____

20- How is your network supported financially?

_____
_____
_____

21- Does your network fund any projects? ☐Yes. ☐No.

Please comment

_____
_____
_____

22- What technological platforms does your network use?

_____
_____
_____

23- In your opinion, what are current technological gaps that exist in your network and that hinder your network from attaining its objectives?

_____
_____
_____

24- In your opinion, how might collaboration among networks help your network achieve its goals? _____
_____
_____

Appendix B
N2N Workshop Exit Survey

Please circle your response to the items. Rate aspects of the workshop on a 1 to 5 scale: 1 = "Strongly disagree," or the lowest, most negative impression 3 = "Neither agree nor disagree," or an adequate impression 5 = "strongly agree," or the highest, most positive impression Choose N/A if the item is not appropriate or not applicable to this workshop. Your feedback is sincerely appreciated. Thank you.

1- Workshop content

	strongly disagree	disagree	neutral	agree	strongly agree
I was well informed about the objectives of this workshop.	☐	☐	☐	☐	☐
The content is relevant to my Network.	☐	☐	☐	☐	☐
This workshop lived up to my expectations.	☐	☐	☐	☐	☐

2- Workshop design

	strongly disagree	disagree	neutral	agree	strongly agree
The workshop objectives were clear to me.	☐	☐	☐	☐	☐
The workshop activities stimulated my learning.	☐	☐	☐	☐	☐
The workshop activities gave me important information to bring back to my Network.	☐	☐	☐	☐	☐
Difficulty level of this workshop was appropriate.	☐	☐	☐	☐	☐
The pace of this workshop was appropriate.	☐	☐	☐	☐	☐
The workshop activities strengthen collaboration between my network and other networks	☐	☐	☐	☐	☐

3- What is least valuable about this workshop?

……………………………………………………………………………………………………
……………………………………………………………………………………………………

4- What is most valuable about this workshop?

………
………..

5- How would you improve this workshop?

………
………

6- Please identify networks that depend on or interact with the Gulf of Mexico that you think should be included in the Network-to-Network initiative.

………
………

7- Please identify stakeholders that depend on or interact with the Gulf of Mexico that you think should be included in the Network-to-Network initiative.

……
……

8- Would you be interested in continuing your participation in the Network-to-Network initiative moving forward?

………
……….

Appendix C
Planning Committee Workshop Exit Survey Questions
N2N PC post workshop survey

2) On a scale of 1 (disagree) to 5 (agree): The planning process was effective: _____

3) On a scale of 1 (disagree) to 5(agree): The implementation process was effective: _____

4) On a scale of 1 (disagree) to 5 (agree): The workshop achieved its purpose: _____

5) On a scale of 1 (disagree) to 5 (agree): Members of the planning committee were effective: _____

6) On a scale of 1 (disagree) to 5 (agree): Members of the support team were effective: _____

7) Please identify the lessons learned from the planning and implementation of the workshop (single sentences (we can fill in with more detail for the report as needed)

8) What were the failures?

9) What were the successes?

10) What, if any changes would you make?

11) Other?

Appendix D
N2N GoM workshop agenda

Time	Activity
8:00am	Registration – Coffee Service Available Location: Foyer – Regency IV 1st Floor
8:30am	Welcome & Introductions Dr. Jack Baldauf, Senior Associate Vice-President for Research, Texas A&M UniversityWhy N2N-GoM in Yucatan? Dr. Zenon Medina-Cetina, Associate Professor, Zachry Department of Civil & Environmental Engineering, Texas A&M University Inauguration of N2N-GoM Mr. Bernardo Cisneros, Secretary of Research, Innovation and Higher Education, State of Yucatan Location: Regency IV 1st Floor
8:45am	Purpose of N2N-GoM Workshop & Logistics Dr. Jack Baldauf Location: Regency IV 1st Floor
9:15am	Network Assessment Report & Focus Group Formation Dr. Khalil Dirani Location: Regency IV 1st Floor
9:45am	Keynote I. "Climate, Communities and Risks: The Reorganization of Water, Ecosystems and People along the Gulf Coast" Dr. Robert Twilley, Coastal & Estuarine Research Federation (CERF) Location: Regency IV 1st Floor
10:30am	Workshop Methodological Framework: Bayesian Risk Assessment & Management Working Group 1: Expectations Dr. Zenon Medina-Cetina Location: Regency IV 1st Floor
10:45am	Coffee Break – Foyer Regency IV 1st Floor
11:00am	Identification & Prioritization of Sector Threats (WG1) WG1 Meeting Rooms: Dr. Jack Baldauf – Izamal (1 floor) – Dark Green Drs. Sharon Herzka & Khalil Dirani – Chichen Itza I (2 floor) – Silver Dr. Alberto Muñoz – Chichen Itza II (2 floor) – Red Dr. Kateryna Wowk – Uxmal II (2 floor) – Gold Dr. Zenon Medina-Cetina – Nicte Ha (1 floor) – Yellow Victor Gutierrez/Alicia Navarrete – Zazil Ha (1 floor) – Light Green
12:45pm	Working Lunch
2:00pm	Working Group 1: Discussion Dr. Zenon Medina-Cetina Location: Regency IV 1st Floor
3:00pm	Panel "Potential Effects of Climate Variability on the Gulf of Mexico"

Time   Activity

- Lauren Alexander Augustine, Executive Director, National Academies of Sciences Gulf Research Program
- Victor Gutierrez Martinez, President of the Commission for Innovation and Technology at the National Business Consulting Council (CCE); and President of the Innovation Commission for the Confederation of Industrial Chambers
- Jan van Smirren, Chair of the Group of Environmental Forces of the Society for Underwater Technology in the U.S.
  Location: Regency IV 1st Floor

4:00pm	Working Group 2: Expectations Dr. Alberto Muñoz Ubando Location: Regency IV 1st Floor
4:15pm	Identification & Prioritization of Vulnerabilities (WG2) WG2 Meeting Rooms: Geopolitics: Dr. Jack Baldauf – Izamal (1 floor) Sea Level Rise: Dr. Sharon Herzka – Chichen Itza I (2 floor) Innovation: Dr. Alberto Muñoz – Chichen Itza II (2 floor) Water Chem/Pollution: Dr. Khalil Dirani – Uxmal I (2 floor) Extreme Weather: Dr. Kateryna Wowk – Uxmal II (2 floor)
5:30pm	Network Development Focus Group: Selected Group Assessment Dr. Khalil Dirani
6:30pm	Dinner

Wednesday 2 October

Time   Activity

8:00am	Keynote II. "Oceanographic Group Efforts and Networking on the Mexican Gulf of Mexico and Caribbean" Dr. Francisco Xavier Chiappa Carrara & Dr. Cecilia Enriquez Ortiz Location: Regency IV 1st Floor
8:45am	Working Group 2 (Continues) WG2 Meeting Rooms: Geopolitics: Dr. Jack Baldauf – Izamal (1 floor) Sea Level Rise: Dr. Sharon Herzka – Chichen Itza I (2 floor) Innovation: Dr. Alberto Muñoz – Chichen Itza II (2 floor) Water Chem/Pollution: Dr. Khalil Dirani – Uxmal I (2 floor) Extreme Weather: Dr. Kateryna Wowk – Uxmal II (2 floor)
9:30am	Working Group 2: Discussion Dr. Alberto Muñoz Ubando Location: Regency IV 1st Floor

Time	Activity
10:30am	Working Group 3: Expectations Dr. Kateryna Wowk Location: Regency IV 1st Floor
10:45am	Coffee Break
11:00am	Identification of Consequences & Possible Solutions (WG3) WG3 Meeting Rooms: Geopolitics: Dr. Jack Baldauf – Izamal (1 floor) Sea Level Rise: Dr. Sharon Herzka – Chichen Itza I (2 floor) Innovation: Dr. Alberto Muñoz – Chichen Itza II (2 floor) Water Chem/Pollution: Dr. Khalil Dirani – Uxmal I (2 floor) Extreme Weather: Dr. Kateryna Wowk – Uxmal II (2 floor)
12:45pm	Working Lunch
2:00pm	Working Group 3 (Continues) WG3 Meeting Rooms: Geopolitics: Dr. Jack Baldauf – Izamal (1 floor) Sea Level Rise: Dr. Sharon Herzka – Chichen Itza I (2 floor) Innovation: Dr. Alberto Muñoz – Chichen Itza II (2 floor) Water Chem/Pollution: Dr. Khalil Dirani – Uxmal I (2 floor) Extreme Weather: Dr. Kateryna Wowk – Uxmal II (2 floor)
3:30pm	Working Group 3: Discussion Dr. Kateryna Wowk Location: Regency IV 1st Floor
5:30pm	Focus Group: Selected Group Assessment Dr. Khalil Dirani
6:15pm	Group Picture
6:30pm	Dinner

Thursday 3 October

Time	Activity
8:00am	Network Development and Focus Groups
8:30am	Working Group 4: Expectations Dr. Sharon Herzka Location: Regency IV 1st Floor
8:45am	Identification of the Attributes of a Successful Network (WG4) WG4 Meeting Rooms: Dr. Zenon Medina-Cetina – Izamal (1 floor) Dr. Sharon Herzka – Chichen Itza I (2 floor) Dr. Alberto Muñoz – Chichen Itza II (2 floor) Dr. Khalil Dirani – Uxmal I (2 floor) Dr. Kateryna Wowk – Uxmal II (2 floor)

Time	Activity
10:00am	Working Group 4: Discussion Dr. Sharon Herzka Location: Regency IV 1st Floor
10:30am	Working Group 5: Expectations Dr. Jack Baldauf Location: Regency IV 1st Floor
10:45am	Coffee Break
11:00am	Establish the Collaborative N2N-GoM Model (WG5) WG5 Meeting Rooms: Dr. Zenon Medina-Cetina – Izamal (1 floor) Dr. Sharon Herzka – Chichen Itza I (2 floor) Dr. Alberto Muñoz – Chichen Itza II (2 floor) Dr. Khalil Dirani – Uxmal I (2 floor) Dr. Kateryna Wowk – Uxmal II (2 floor)
12:45pm	Working Lunch
2:00pm	Working Group 5 (Continues) WG5 Meeting Rooms: Dr. Zenon Medina-Cetina – Izamal (1 floor) Dr. Sharon Herzka – Chichen Itza I (2 floor) Dr. Alberto Muñoz – Chichen Itza II (2 floor) Dr. Khalil Dirani – Uxmal I (2 floor) Dr. Kateryna Wowk – Uxmal II (2 floor)
2:30pm	Working Group 5: Discussion Dr. Jack Baldauf Location: Regency IV 1st Floor
3:30pm	Next Steps Dr. Jack Baldauf
4:30pm	Summary of N2N-GoM Yucatan 2019 Dr. Jack Baldauf, Senior Associate Vice-President for Research, Texas A&M UniversityWhy not N2N-GoM in Yucatan again in 2020? Dr. Zenon Medina-Cetina, Zachry Department of Civil & Environmental Engineering, Texas A&M UniversityClosure of N2N-GoM Yucatan 2019 Mr. Bernardo Cisneros, Secretary of Research, Innovation and Higher Education, State of Yucatan
5:30pm	Dinner

Appendix E
List of N2N GoM workshop participants

Name & Title	Network / Stakeholder
Dr. Kevin Robbins; Associate Professor	American Association of State Climatologist & Southern Region Climate Center, Asociación Mexicana de Climatología Estatal & Centro Climático de la Región Sur
Katie Thompson, Program Manager	Caribbean Marine Research and Conservation Program (CariMar), Investigación Marina del Caribe y Programa de Conservación
Dr. Kenndey Obombo Magio; Faculty & CONACYT Researcher	Center for Responsible Travel, Centro para el Transporte Responsable
Dr. Robert Twilley; Past-President	Coastal & Estuarine Research Federation (CERF), Federación de Investigación Costera y Estuarios
Dr. Khalil Dirani; Associate Professor	Education and Human Development Department, Texas A&M University, Departamento de Educación y Desarrollo Humano
Dr. Jan van Smirren; Chair	Group of Environmental Forces of the Society for Underwater Technology, Sociedad de Tecnología Submarina - Grupo de Fuerzas Ambientales

Dr. Jessica Henkel, Science Advisor	Gulf Coast Ecosystem Restoration Council (RESTORE), Consejo de Restauración del Ecosistema de la Costa del Golfo
Dr. Barbara Kirkpatrick; Director	Gulf of Mexico Coastal Ocean Observing System (GCOOS), Sistema de Observación del Océano Costero del Gulfo de México
Dr. Rebecca Allee; Senior Scientist	Gulf of Mexico Large Marine Ecosystem Program (GOM LME), Programa de Ecosistemas Marinos del Golfo de México
Dr. Katya Wowk; Senior Research Scientist	Harte Research Insitute, Instituto de Investigación para Estudios del Golfo de México
Dr. Lauren Alexander Augustine ; Executive Director	National Academies of Sciences (NAS) Gulf Research Program, Academia Nacional de Ciencias Programa Investigación del Golfo
Dr. John Allen, Founder & Board Member (RPSEA)	Research Partnership to Secure Energy for America (RPSEA), Subsea Systems Institute (SSI)/ Sociedad de Investigación para el Aseguramiento de Energía, Instituto de Sistemas Submarinos
Dr. Jack Baldauf; Senior Associate Vice President for Research & Professor Oceanography	Texas A&M University Division of Research & Department of Oceanography
Zenon Medina-Cetina; Associate Professor & Co-Principle Investigator	Zachry Department of Civil Engineering Texas A&M University & Yucatan Initiative, Departamento de Ingeniería Civil y Ambiental & la Iniciativa Yucatán

List of N2N GoM workshop participants (continued)

Daniel Ernesto Benet Sanchez Noriega: Director for Strategic Projects; **Francisco Javier Tadeo Castillo**: Regulation and Policy Director	Agency of Security, Energy and Environment of the Hydrocarbons Sector, Agencia de Seguridad, Energía y Ambiente (ASEA) del sector hidrocarburos
Ing. Carlos Medina Rodríguez; Coordinator	Confederation of Industrial Chambers of Mexico, Confederación de Cámaras Industriales (CONCAMIN), Zona Suoreste
Dr. Ernesto García Mendonza; Network Coordinator	Harmful Algal Bloom Network, Red de Florescimientos Algales Nocivos (RedFAN)
ing. Víctor Gutiérrez Martínez; President	Innovation Commission for the Confederation of Industrial Chambers & Commission for Innovation and Technology at the National Business Consulting Council,La Confederación de Cámaras Industriales de los Estados Unidos Mexicanos (CONCAMIN)
Jaime Urrutia Fucugauchi, Secretary for International Affairs,	Mexican Geophysics Union, Union Geofísica Mexicana (UGM)
Dr. Alberto Muñoz; Chief Innovation Officer	National Chamber for Electronic, Telecommunications and Information Technology Industries, CÁMARA NACIONAL DE LA INDUSTRIA ELECTRÓNICA, DE TELECOMUNICACIONES Y TECNOLOGÍAS DE LA INFORMACIÓN (CANIETI)
Erwin Armando Martí Flores, Biologist	National Institute for Ecology and Climate Change, Instituto Nacional de Ecología y Cambio Climático (INECC).

Dr. Jorge Zavala, Coordinador General; **Fabian Vazquez Romaña;** Manager of Observation and Telematics Networks	National Meteorological Service, Servicio Metereológico Nacional (SMN)
Dr. María Eugenia Ibarrarán Viniegra; Director	Network for Atmospheric Contamination & Climate Change Mitigation, Red de Contaminación Atmosférica y Mitigación del Cambio Climático (REDCAM)
Dr. Francisco Xavier Chiappa Carrara; RECORECOS Representative in UNAM **Dr. Cecilia Enriquez Ortiz;** Professor, Department of Coastal Zones Management, UNAM SISAL	Southeast Coastal Resources Knowledge Network, Red para el Conocimiento de los Recursos Costeros del Sureste (RECORECOS)
Dr. Juan Carlos Herguera, Principal Investigator	Research Consortium for the Gulf of Mexico, Consorcio de Investigacion del Golfo de Mexico (CIGOM)
Dr. Sharon Herzka, Coordinator for Environmental Monitoring and Baseline Studies	Research Consortium for the Gulf of Mexico, Consorcio de Investigacion del Golfo de Mexico (CIGOM),
Dr. Daniel Pech, Director	South Border College Campeche, Colegio de la Frontera Sur (ECOSUR) Campeche
Dr. Víctor Vidal, Coordinador	Southeast Interinstitutional Network for Climate Change, Red Interinstitucional de Cambio Climatico del Sureste de Mexico
Dr. Arnoldo de la Garza Guerra; Director	Tamaulipas Commission of Science and Technology, Consejo Tamaulipeco de Ciencia y Tecnología

List of N2N GoM workshop participants (continued)

Dra. Elisa Guillen Arguelles; Network Coordinator	Thematic Network for the Interdisciplinary Study of Tourism, Red Temática de Estudios Multidisciplinarios de Turismo (Focus on Yucatán, Campeche, Quintana Roo) - (REMTUR)
Dr. Alfredo Ortega Rubio; Director	Thematic Network for the Research of Protected Areas, Red temática de investigación sobre Áreas Naturales Protegidas (RENANP)
Dra. Evelia Rivera Arriaga; Director	Thematic Network for the Study of Coasts and Oceans, Red Temática Internacional de Costas y Mares (RICOMAR)
Dr. Carlos Welsh; Director	Thematic Network for the Study of Disasters Associated with Hydrometereological and Climate, Red Temática Desastres asociados a fenómenos hidrometeorológicos y climáticos (REDESCLIM)
Dr. Antonio Rodríguez Martínez; Director	Thematic Network for Sustainable Energy, Environment and Society, RED Temática Sustentabilidad Energética, Medio Ambiente y Sociedad (SUMAS)
Ing. Ricardo Bello Bolio, Director General & Co-Principle Investigator	Yucatan Research and Innovation & Yucatan Initiative, Investigación e Innovación de la SIIES e Iniciativa Yucatán

Bernardo Cisneros Buenfil; Secretary for Research and Innovation	System of Research, Innovation and Development Technology of the State of Yucatan, Sistema de Investigación, Innovation y Desarrollo Tecnológico del Estado de Yucatán (SIIDETEY)
Dr. Clarie Hemingway; Program Director	National Science Foundation Office of International Science and Engineering, Fundación Nacional de Ciencia Oficina de Ciencia e Ingeniería Internacional

Appendix F N2N GoM Workshop Presentations (day 1)

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Appendix F N2N GoM Workshop Presentations (day 1)

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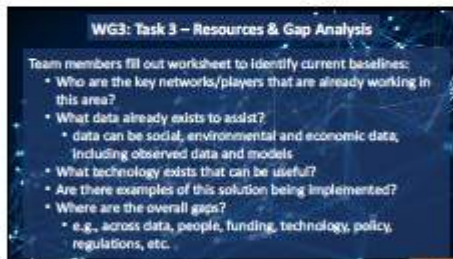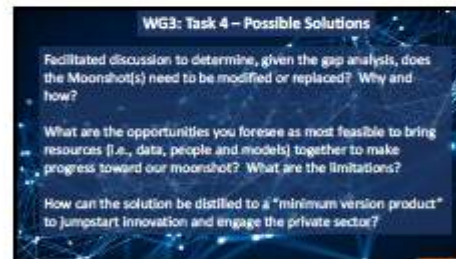
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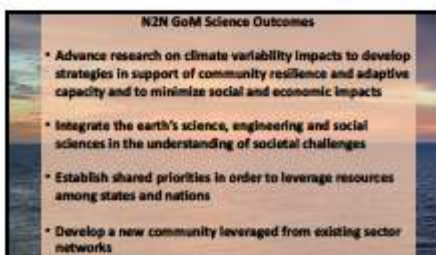# Appendix G N2N GoM Workshop Presentations (day 2)

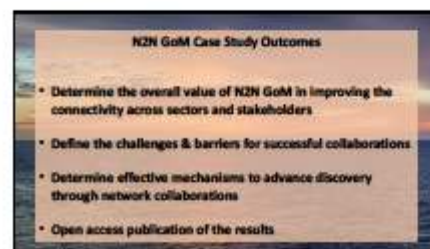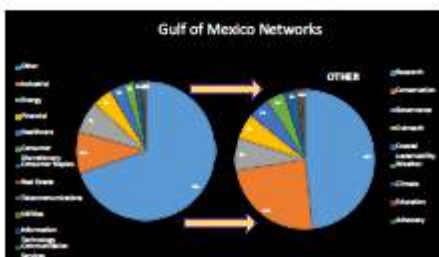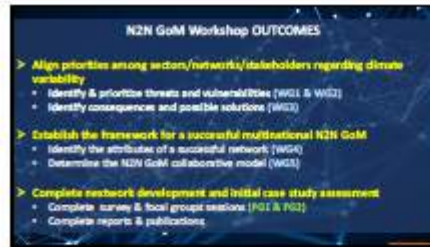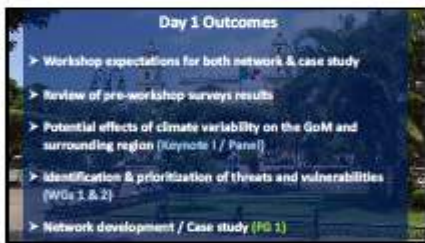

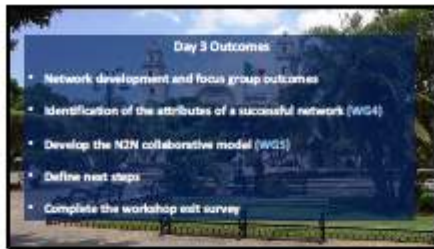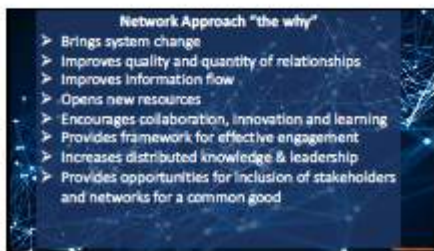Slide 1

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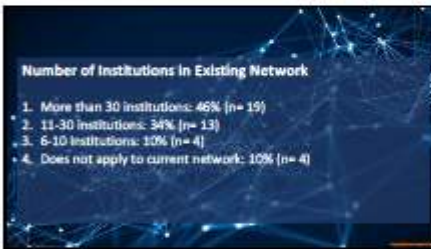

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Appendix G N2N GoM Workshop Presentations (day 2)

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Appendix G N2N GoM Workshop Presentations (day 2)

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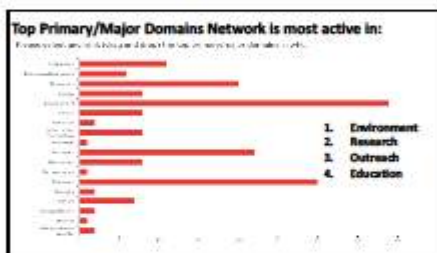

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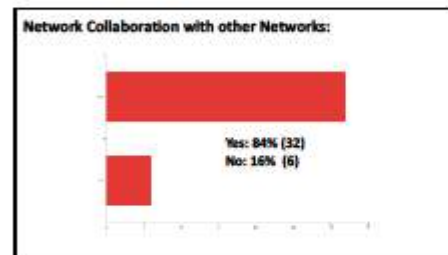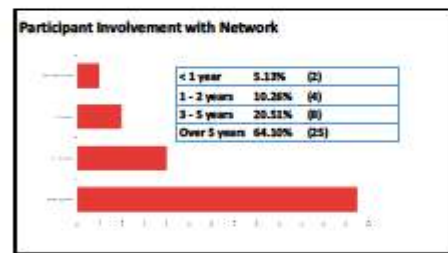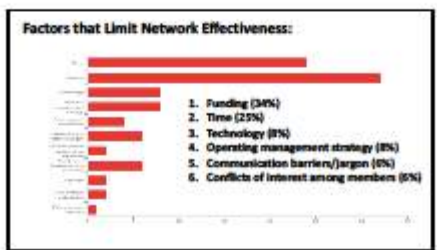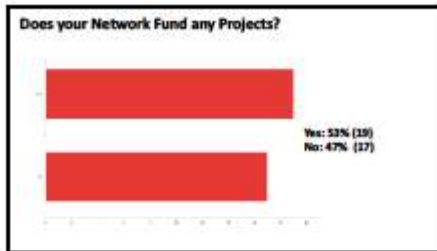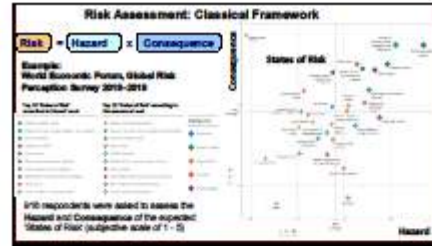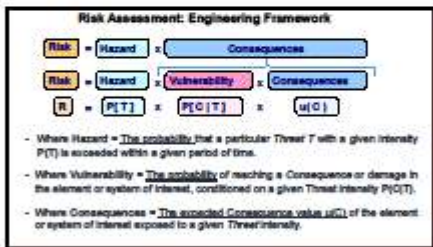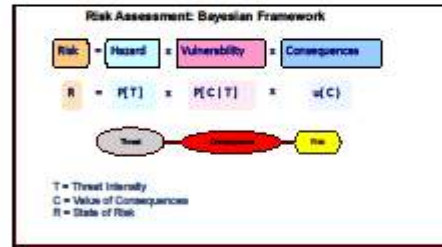# Appendix G N2N GoM Workshop Presentations (day 2)

Network Top Challenges

1. Sharing Data
2. Community Resilience
3. Joint Research/Multidisciplinary Collaboration
4. Influence Public Policy
5. Discuss Climate Change
6. Dissemination of Information

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Your Network is Best at

1. Bringing together different individuals or groups
2. Capitalizing on existing knowledge
3. Helping to work more efficiently and effectively
4. Organizing and managing important information

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Top Primary/Major Domains Network is most active in:

1. Environment
2. Research
3. Outreach
4. Education

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Network Collaboration with other Networks:

Yes: 84% (32)
No: 16% (6)

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Respondent Relationship to Network:

Participant: 90% (32)
Leader: 16% (6)

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Participant Involvement with Network

< 1 year	5.13%	(2)
1 - 2 years	10.26%	(4)
3 - 5 years	20.51%	(8)
Over 5 years	64.10%	(25)

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Factors that Limit Network Effectiveness:

1. Funding (34%)
2. Time (25%)
3. Technology (8%)
4. Operating management strategy (8%)
5. Communication barriers/jargon (6%)
6. Conflicts of interest among members (6%)

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Network Success Depends on

1. Adopting a consistent attitude to collaboration and knowledge sharing (Count= 30, 13%)
2. Raising the strategic relevance of the network in a specific sector (Count= 29, 13%)
3. Building trust, rapport, and a sense of community (Count= 28, 12%)
4. Securing sufficient funding to achieve network goals (Count= 28, 12%)

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Appendix G N2N GoM Workshop Presentations (day 2)

Does your Network Fund any Projects?

Yes: 53% (19)
No: 47% (17)

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Technology Platform Networks Use:

- WhatsApp/Videoconferencing/Zoom/Youtube/Webex
- Coastal Resilience online web mapping tool
- Information management through the Environmental Data Initiative (EDI) and PASTA
- *My network is challenged by lack of investment in common systems that would enable us to function in a more streamlined manner and consistently*

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Technological Gaps that Hinder Networks:

- Poor Communication (especially in Cuba)
- Lack of common systems/platforms used for day-to-day work
- Dissemination of Information
- Data Management
- Funding/Money

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How N2N Collaboration Help Networks:

- More Shared Information/Increased Data Exchange
- Synergy between the networks to achieve a deeper knowledge and understanding of the large system of the Gulf of Mexico
- Improve knowledge resources and community connections
  - *Always strength in numbers*
  - *Anything that promotes a one Gulf strategy is a good one*

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More Data Collection

Two Focus Groups Discussion (Reflection-in-Action)
- ~ 30 minutes discussion
- End of day 1 (Group 3)
- End of day 2 (Group TBD)
- Purpose to get participants' experiences and reflections on the process
- Help team with future plans
- Data gathered from focus groups will be shared with all participants

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More Data Collection

- Exit Survey
  - End of Day 3
  - Online survey
  - 10-15 minutes
- Post Workshop Survey (reflection on Action)
  - Purpose is to draw lessons from the workshop experience
  - Online survey that will be sent out by mid October

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Keynote 1

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Keynote Speaker

Presentation: Climate, Communities and Risks: The Reorganization of Water, Ecosystems and People along the Gulf Coast

Dr. Robert Twilley: *Executive Director, Louisiana Sea Grant College Program; Professor, Department of Oceanography and Coastal Science, Louisiana State University email: rtwilley@lsu.edu*

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Appendix G N2N GoM Workshop Presentations (day 2)
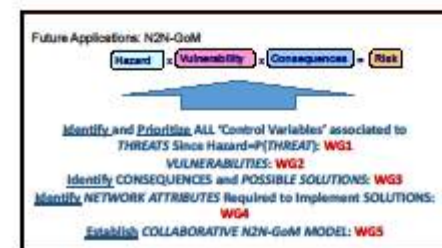

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Appendix G N2N GoM Workshop Presentations (day 2)

Working Group 1 (WG1)

Hazard × Vulnerability × Consequences = Risk

Let's start with HAZARD Assessment:
Need to Identify and Prioritize THREATS, to be able to assess the first
Risk Factor: Hazard=P(THREAT)

THREATS:
Hurricanes, Loop Currents, Sea-Level Rise, Extreme Weather Events,
Sargasso, Saline Intrusion, Oil Spills, Trash Islands, Government
Policies (or lack of), ...

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Please proceed to Breakout Rooms

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WG1 Discussion

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Panel: Potential effects of climate variability on the GoM

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Panel Discussion

>Dr. Lauren Alexander Augustine: Executive Director, National
Academies of Sciences Gulf Research Program

>Victor Gutierrez: President of the Commission for Innovation and
Technology at the National Business Consulting Council (CCE);
President of the Innovation Commission for the Confederation of
Industrial Chambers

>Jan van Smirren: Oceanographer with Ocean Sierra LLC, Chair of
the Group of Environmental Forces of the Society for Underwater
Technology

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Identification and cross sectoral prioritization of *vulnerabilities* (WG2)

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Working Group 2 (WG2)

Hazard × Vulnerability × Consequences = Risk

Let's start with HAZARD Assessment:
Need to Identify and Prioritize THREATS, to be able to assess the first
Risk Factor: Hazard=P(THREAT)

THREATS can be of
+ Natural Origin: E.g. Hurricanes, Loop Currents, Sea-Level Rise,
Extreme Weather Events, Sargasso, Saline Intrusion, ...
+ or of Anthropogenic Origin: E.g. Oil Spills, Trash Islands,
Government Policies (or lack of), ...

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Vulnerabilities (Working Group 2)

> Vulnerability is the degree to which people
or the things they value are susceptible to,
or are unable to cope with, the adverse
effects of climate variability.

> It is a function of the type, magnitude
variability, and rate of climate variability

McCarthy et al, 2001

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Appendix G N2N GoM Workshop Presentations (day 2)
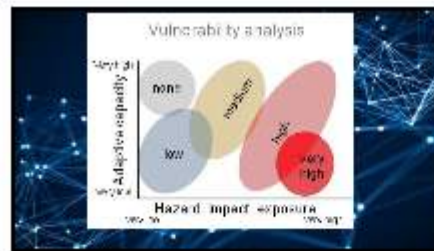
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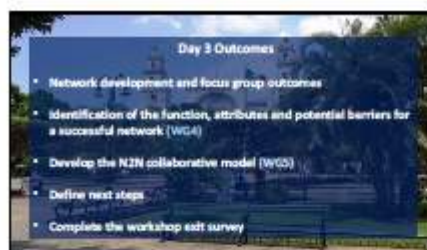Slide 95

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Appendix H N2N GoM Workshop Presentations (day 3)
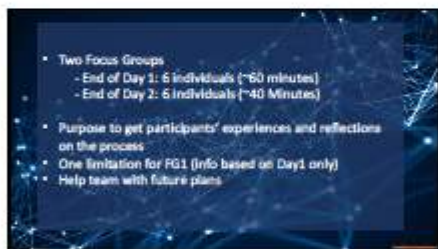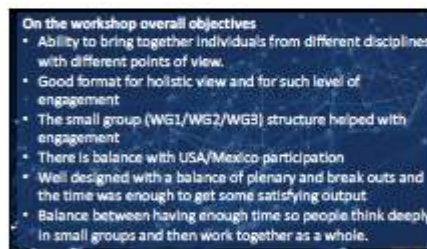

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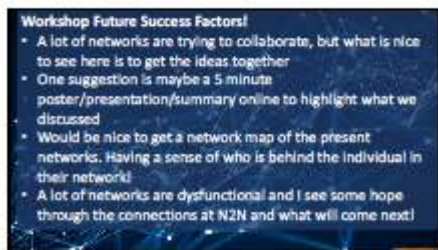

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Appendix H N2N GoM Workshop Presentations (day 3)

Workshop Highlight?
- Overall organization
- Facilitation was important in getting outputs that were critical
- The overall presentation of the workshop, maybe we do not agree with the threats but the productivity and engagement were very high
- A success was this WG2. The participants in the workgroup decided to be together based on mutual interest/threat. Unlike WG1 (Day 1 morning), in WG2 we knew we could provide information and be productive . We became a team!

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Workshop Highlight?
- Not everyone agrees on the format or the model, but that does not stop the process. It is important that thinks were acknowledged and not dismissed.
- The facilitation of the discussion was very effective and without that we could not reach the results.
- Keynote Speakers
- Keynote speaker going over the gulf of Mexico and present models with similar threats.
- Keynote speaker with the photo of his grandchildren.
- The panel discussion was a revealing moment.
- Size, 40-50 participants is a good number. Also, small groups are excellent.
- The realization that we share some common problems, on both sides of the boarder. We need to understand how the systems work.
- Coffee non-stop

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What would you do differently?
- For such a project one would wonder: Do you invite everyone or do you invite a small group?
- For the purpose of this workshop, we do not have all expertise/sectors present and some elements are missing, but the folks here have a diversity of expertise.
- Small steps of success, that is when you bring in the local communities. But do not invite local communities at this point.
- Also invite politicians and decision makers at a certain point, but they would not add to this initiative right now.
- Be targeted and strategic with the time reporting results in the big group. Identify the redundancy and provide summaries is more effective

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What would you do differently?
Good discussion, but what was discussed about vulnerability is too short. A common framework would be better.
The purpose as I understand it, is mainly focus on shared priorities but I feel more comfortable if you provide us with a specific problem!
Get input sometime in the future from the communities and engage them with understanding the threats and vulnerabilities.
   Get out of our comfort zone
   Local communities can provide other variables

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Appendix H N2N GoM Workshop Presentations (day 3)

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Appendix H N2N GoM Workshop Presentations (day 3)

Draft Characteristics of N2N GoM
Goals
- Provide multinational connectivity among networks, sectors, and stakeholders
- Establish network and stakeholder clusters addressing specific T/V/C solutions
- Leverage existing capacities and resources for attaining shared solutions
- Obtain new resources for attaining shared solutions
- Develop and implement a multinational, cross sectoral, decadal agenda for the GoM and surrounding region
- Engage and inform decision makers in finding solutions to reduce risk

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Draft Characteristics of N2N GoM
Values
- Embrace a culture of excellence and respect regardless of: age, cultural identity, gender identity or expression, nationality, physical and mental ability, political and ideological perspectives, racial and ethnic identity, religious and spiritual identity, sexual orientation, or social and economic status
- Leverage diversity and foster inclusion to deliver innovation of ideas that can translate into breakthroughs and accelerate transformation
- Cultivate a dynamic and transparent environment of collaboration

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Draft Characteristics of N2N GoM
Resources
- Leverage existing resources through sharing (where appropriate) knowledge, data, expertise, facilities, etc.
- Attain resources through traditional venues
  - Joint funding proposals to state and federal agencies
- Attain resources through New venues
  - Sectoral partnerships & collaborations
  - Joint multinational funding proposals to state & federal agencies
  - Partnership with foundations
  - Development of state and federal, multinational collaborations

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Draft Characteristics of N2N GoM
Membership
- Include networks and stakeholders that:
  - Share the vision of N2N GoM and are willing to contribute to the success of the initiative
  - Are engaged in the GoM and surrounding communities
  - Are engage some aspect climate change in the Gulf of Mexico

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Draft Characteristics of N2N GoM
Organization
- The Steering Committee (SC) will provide the initial coordination and framing of N2N GoM
- The SC will be responsible for effective communication, coordination, and engagement
- Working Groups (WGs) will be established to focus on specific threats, vulnerabilities and/or solutions

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Draft Characteristics of N2N GoM
Governance 1
- All N2N GoM members have equal representation
- SC will consist of initial proponents and additional interested individuals selected to increase diversity, knowledge, and expertise
- The SC chair will be selected from the SC members
- WGs will be commissioned/decommissioned by the SC

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Draft Characteristics of N2N GoM
Governance 2
- WGs will be populated by N2N GoM members and other thought leaders as required
- N2N GoM bylaws will be drafted by the SC and ratified by N2N GoM members; The bylaws will be established by simple majority
- Formal agreements will be developed by the SC as required

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Draft Characteristics of N2N GoM
Coordination
- SC will meet quarterly via teleconference
- SC will meet in person twice each year
- Working groups will meet as necessary
- N2N GoM members will meet twice annually via teleconference and once annually in person

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Appendix H N2N GoM Workshop Presentations (day 3)

Draft Characteristics of N2N GoM Member Incentives

➤Increased efficiency and reduced cost

➤Leadership in development and implementation of solutions

➤New and diverse collaborations

➤Collaboration on funding opportunities

➤Contribution to the development and implementation of the decadal GoM agenda

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Draft Characteristics of N2N GoM Other

➤ List other characteristics

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Room Assignments

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Please proceed to Breakout Rooms

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WG5 Discussion

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Next Steps

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N2N GoM Next Steps

➤ Solidify N2N GoM membership

➤Establish N2N GoM Steering Committee

➤Design and Develop N2N GoM Bylaws

➤Leverage GoM capacity

➤Establish existing and New funding sources

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N2N GoM Next Steps

➤Publications

➤Develop multinational, cross sectorial decadal GoM agenda

➤Establish next N2N GOM meeting

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Appendix H N2N GoM Workshop Presentations (day 3)

Solidify N2N GoM membership

> Participants to identify GoM networks & stakeholders (prior to departure / post workshop email – jbaldauf@tamu.edu)

> Summarize workshop results and circulate to all GoM networks & stakeholders
> Network & Stakeholder's email N2N GoM membership intention
> Initial expression of N2N GoM membership finalized
> Circulate revised N2N GoM membership list to members

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Establish N2N GoM Steering Committee

> Draft terms of reference for Steering Committee

> Circulate terms to N2N GoM membership for input

> Feedback provided

> Finalize terms of reference & call for expression of interest

> Establish Steering Committee

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Establish N2N GoM Bylaws

> Define N2N GoM bylaws

> Circulate to members for review

> Input to SC concerning draft bylaws

> Finalize document and circulate for ratification

> Bylaws ratified

> Confirm membership based on established bylaws

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Leverage N2N GoM capacity
> Develop System Mosaic

> Refine and cross thread threats with multiple vulnerabilities based on workshop and additional input

> Map network & stakeholders to mosaic and identify network pods for common threats and vulnerabilities

> Identify N2N GoM capacity

> Diversify network pod participants to diversity knowledge and capacity.

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Establish existing and New funding sources

> Identify quick wins

> Submit N2N GoM phase 2 NSF proposal

> Align efforts with Agencies, state, federal sectors, and foundations, etc.

> Develop NSF – CONACYT and other proposal targeting solutions as well as long term sustainability of the program

Slide 45

Publications

> Complete NSF / Yucatan N2N GoM Project Report

> Complete N2N-GoM case study Phase 1 manuscript

> Develop PR package, press release etc.

> Complete initial summary on threats, vulnerabilities and consequences based on workshop and post workshop input

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Establish multinational decadal agenda for the Gulf of Mexico

> Expand initial elements of threats, vulnerabilities, consequences and possible solutions

> Complete decadal framework draft to be finalized at the next N2N meeting (late 2020/2021)

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Complete "Exit Survey"

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Appendix H N2N GoM Workshop Presentations (day 3)

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Appendix I
Workshop 1 forms

WG1: INSTRUCTIONS FOR FACILITATOR
Day 1, 11:00a-2:00p
Facilitator: Summarizes input on flipchart
Notetaker: Takes detailed notes on all discussion
Spokesperson: Summarizes final input into Google Report Out sheet, and reports out to all groups in plenary

1. ~10mins – Facilitate Group Introductions & Select Group spokesperson

2. ~10mins – Discuss the market sector
Potential questions:
● What is the market sector we're considering?
● What does this market sector mean to you?
● Why does your network or stakeholder group care about this market sector?
3. ~10mins – Individual input on threats

4. ~30mins – Clarify responses – we are asking for short clarification only about what the threats are or what they mean. In addition, this time can be used to merge similar ideas/threats.

5. ~2hrs (with lunch) – as a group, respond to the following. (NOTE: spend about 30mins on each threat. The spokesperson summarizes input in the online Google Doc.)
   a. Identify the top three threats for this market sector
   b. Define the top three threats for this market sector
   c. For each threat, include the rationale for 'why' it is a priority threat

WG1: Participant Input

Participant name:_____

Network/Stakeholder: _____

Please note that we will collect these responses at the end of the exercise.

1. Select a group spokesperson (for plenary report out)

2. Discuss with the group what the market sector means to you

3. Individually write down all the threats you think may impact your market sector, focusing especially on: i) Threats in the next 10 years; ii) Threats that will have the biggest impact.

4. Share your response with the group and ask clarifying questions
5. As a group discuss, what are the top three threats for this sector, and why?

THREAT	RATIONALE
I.	
II.	
III.	

Appendix J
Workshop 2 forms

WG2 INSTRUCTIONS FOR FACILITATOR
Day 1, 4:15p-5:30p & Day 2, 8:45a-9:30a
Facilitator: Summarizes input on flipchart
Notetaker: Takes detailed notes on all discussion
Spokesperson: Summarizes final input into Google Report Out sheet, and reports out to all groups in plenary
Day 1
- ~5 min instructions
- ~40 mins group discussion of vulnerabilities to the threat, across social, economic and environmental aspects
- ~20 mins group discussion to deeply define each vulnerability - what assets are impacted and how?
- ~ 10 mins - summarize content for the working group

Day 2
- ~30 mins group discussion to continue to deeply define each vulnerability - what assets are impacted and how?
- ~ 15 mins - summarize content for the working group

- **WG2: Participant Input**
- Participant name:_____
- Network/Stakeholder: _____
- Please note that we will collect these responses at the end of the exercise.
- Instructions for Working Group exercise:
- 1. What are the vulnerabilities specific to this threat, across social, economic and environmental aspects?
- *Vulnerability*: a system that can be damaged by a threat

- Social systems:
- Economic systems:
- Environmental systems:

Appendix K
Workshop 3 forms

WG3 INSTRUCTIONS FOR FACILITATOR

Day 2, 11:00 - 3:30p

Facilitator: Summarizes input on flipchart
Notetaker: Takes detailed notes on all discussion
Spokesperson: Summarizes final input into Google Report Out sheet, and reports
out to all groups in plenary

1. ~30 mins - Reflect on and revise written draft statement of the threat and associated vulnerabilities, considering:
   a. Why is it important to you to address this threat and vulnerabilities? How could the detailed description of the threat and vulnerabilities be improved so that it captures what your network or stakeholders care about? (i.e., the *consequences*)
   b. Does the description necessitate participation from and collaboration between networks and stakeholders? How could it be improved?

2. ~1 hour – DREAM the "moonshot" or "sueño guajiro" - Participants will "dream" possible solutions to the threats and vulnerabilities, focusing on those that would represent a breakthrough. For each solution, describe:
   a. Describe the solution / moonshot
   b. Does the solution address a threat, vulnerability or consequence?
   c. What is the spatial scale of the solution?
   d. What is the temporal scale?
   e. Elaborate on the potential impact of the solution

3. ~2 hours (w/ Lunch) - Resources & Gap Analysis - Conduct a detailed gap analysis to both identify current baselines and priority information and resource needs.

Solution (1,2,3,....)
● Who are the key networks/players that are already working in this area?
● What data already exists to assist? (data can be social, environmental and economic data, including observed data and models)
● What technology exists that can be useful?
● Are there examples of this solution being implemented?
● Where are the overall gaps? (e.g., across data, people, funding, technology, policy, regulations, etc.)

4. ~30 mins - Given the gap analysis, what are the opportunities you foresee as <u>most feasible</u> to bring resources (i.e., data, people and models) together to make progress toward our moonshot? What are the limitations?

5. ~30 mins - Summary input for report out - focus on summarizing input from #4 (most feasible solutions). Report outs can be 10mins in length.

WG3: Participant Input

Participant name:_____

Network/Stakeholder: _____

Please note that we will collect these responses at the end of the exercise.

Instructions for Working Group exercise:

1. *Reflect* - Reflect on and revise the written draft statement of the threat and associated vulnerabilities, considering:
   a. Why is it important to you to address this threat and vulnerabilities? How could the detailed description of the threat and vulnerabilities be improved so that it captures what your network or stakeholders care about? (i.e., the *consequences*)

   b. Does the description necessitate participation from and collaboration between networks and stakeholders? How could it be improved?

2. *DREAM* – Dream the "moonshot" or "sueño guajiro," focusing on those that would represent a breakthrough. A moonshot may be thought of a project or proposal that: Addresses a huge problem; Proposes a radical solution; Uses breakthrough technology. For each solution:
   a. Describe the solution / moonshot

   b. Does the solution address a threat, vulnerability or consequence?

   c. What is the spatial and temporal scale of the solution?

   d. Elaborate on the potential impact of the solution

3. *Resources & Gap Analysis* - Conduct a detailed gap analysis to both identify current baselines and priority information and resource needs.

Solution _____

Key networks/ stakeholders	
Existing data (social, environmental, economic, observed data, models)	
Existing technology	
Existing resources	
Examples	
Gaps (data, people, funding, technology, policy, regulations, etc.)	

4. *Feasible Solutions* - Given the gap analysis, what opportunities are <u>most</u> <u>feasible</u> to bring resources (i.e., data, people, models) together to make progress toward our moonshot? What are the limitations?

Appendix L
Workshop 4 forms

Task 1 for WG 4 : Review list of network functions and complement if necessary. Please rank the network functions in order of most to least important.

Network function addresses the question: what do you want your network to do?

Rank

_____identify, create, store, share, and use knowledge
_____reduce the learning curve for new participants
_____enable professional development
_____increase operational efficiency
_____permit faster problem solving and better response time
_____showcase good practices
_____spawn new ideas for products and services
_____enable accelerated learning
_____connect learning to action
_____builds community
_____deliver an outcome
_____Other

Task 2 for WG4: Review list of network attributes and complement if necessary. Please rank the network functions in order of most to least important.

Network attributes describe the characteristics of a network that contribute to its success.

Rank

_____Encourages peer relationships
_____Fosters and supports collaboration for mutual benefit
_____Has shared vision of the identity, purpose and work
_____Ownership and value recognized by all participants
_____Capacity to enable actions that maximize impact
_____Effective engagement and connectivity
_____Recognized and valued by the broader field
_____Has accepted governance and administration practices
_____Is sustainable/enduring
_____Acceptance of differences
_____Is built on and fosters trust
_____Engagement stakeholders
_____Ensures accountability

_____Established openness and transparency
_____Supports leadership and action
_____Promotes innovation and experimentation
_____Others (please specify)

Task 3 for WG4: Review list of barriers that could hinder the success of N2N and complement if necessary:

Barriers are challenges or conditions that may hinder network success and need to be addressed explicitly.

Rank

_____Time
_____Funding
_____Technology
_____Operating management strategy
_____Awareness of capabilities
_____Lack of support
_____Communication barriers/jargon
_____Member groups appear to be exclusive
_____Conflicts of interest among members
_____Language
_____Lack of vision and mission
_____Others (please specify)

Please rank the network functions in order of most to least important.

Task 4 for WG4: Fill out the following handout in representation of your network.

Participant name:_____

Network/Stakeholder: _____

Please identify your network needs pertaining to N2N:

System	Consequence	Solution
Marine and coastal ecosystem	- Eco system services - Population numbers - biodiversity - collapse of ecosystem - Habitat loss	- Response plan - Enough barriers - new tech barriers - budget (money on time) - training

	• loss of ecosystem community	
Marine wild life	• Individual death • population numbers • biodiversity	
Aquifers	• Contamination • water quality • Clean water availability	
Fisheries	• income loss • social impact/livelihood • social conflict • lower marine food availability • Market damage	
Human Health	• Respiratory problems • Toxic accumulation • mutations • pathological events • psychological problems • cancer	
Tourism	• decrease no. of tourists • decrease quality of life • decrease in income • livelihoods • other systems (urban and ecological)	
Energy infrastructure	• increase in energy disruption • dead and injured people • structural damage • market fluctuation • loss of income • promotion of renewable energy • cost association • Insurance cost	

Right column:

- Need networking capacity
- Network taskforce
- oil removal ships
- technology of observation
  - *satellite images*
  - *drones*
  - *radars*
  - *micro buoys*
  - *gliders*
  - *after spill monitoring*
  - *biotech tools*
- Restoration and conservation
  - *aquaculture*
  - *aquaman*
  - *coral reef rescue program*
  - *decrease in bureaucracy*
- Reforestation
- water treatment
- soil and sediments remediation
- Disposing of waste/dead bodies
- temporary employment programs
- community engagement
- effective health services
- health insurance availability
- clean up tourism
- alternative tourism promotions
- clarifying public perceptions

Better engineering
Energy transition
Monitoring after spill
Money machine

Appendix M
Workshop 5 form

Below is the start of a draft N2N GoM framework. Please review the text below and provide comments and suggestions for improvement

1) Purpose: Use the power of networks to comprehensively address the economic, environmental and social threats facing the Gulf of Mexico and surrounding coastal communities caused by climate variability

2) Goals:
   (a) Provide multinational connectivity among networks, sectors, and stakeholders;
   (b) Establish network and stakeholder clusters addressing specific T/V/C solutions;
   (c) Leverage existing capacities and resources for attaining shared solutions;
   d) Obtain new resources for attaining shared solutions;
   (e) Develop and implement a multinational, cross sectoral, decadal agenda for the GoM and surrounding region; and (f) Engage and inform decision makers in finding solutions to reduce risk

3) Values: Embrace a culture of excellence and respect regardless of age, cultural identity, gender identity or expression, nationality, physical and mental ability, political and ideological perspectives, racial and ethnic identity, religious and spiritual identity, sexual orientation, or social and economic status. Leverage diversity and foster inclusion to deliver innovation of ideas that can translate into breakthroughs and accelerate transformation. Cultivate a dynamic and transparent environment of collaboration

4) Resources:
   (a) Leverage existing resources through sharing (where appropriate) knowledge, data, expertise, facilities, etc.;
   (b) Attain resources through traditional venues;
   (c) Joint funding proposals to state and federal agencies;
   (d) Attain resources through New venues; € Sectoral partnerships & collaborations;
   (f) Joint multinational funding proposals to state & federal agencies; and
   (g) Partnership with foundations;
   (h) Development of state and federal, multinational collaborations

5) Membership
will include networks and stakeholders that: share the vision of N2N GoM and are willing to contribute to the success of the initiative; are engaged in the GoM and surrounding communities; and are engaged in some aspect of climate change in the GoM.

6) Organization: The Steering Committee will provide the initial coordination and framing of N2N GoM. The Steering Committee will be responsible for effective communication,

coordination, and engagement. The Working Groups will be established to focus on specific threats, vulnerabilities and/or solutions

7) Governance:
   (a) All N2N GoM members have equal representation;
   (b) SC will consist of initial proponents and additional interested individuals selected to increase diversity, knowledge, and expertise;
   (c) The SC chair will be selected from the SC members; (d) WGs will be commissioned/decommissioned by the
   (e) WGs will be populated by N2N GoM members and other thought leaders as required;
   (f) N2N GoM bylaws will be drafted by the SC and ratified by N2N GoM members. The bylaws will be established by simple majority; and
   (g) Formal agreements will be developed by the SC as required

8) Coordination:
   (a) SC will meet quarterly via teleconference;
   (b) SC will meet in person twice each year;
   (c) Working groups will meet as necessary; and
   (d) N2N GoM members will meet twice annually via teleconference and once annually in person

9) Member incentives:
   (a) Increased efficiency and reduced cost;
   (b)Leadership development and implementation of solutions;
   (c) New and diverse collaborations;
   (d) Collaboration on funding opportunities and
   (e) Contribution to the development and implementation of the decadal GoM agenda