

Communicating Value to Partner Institutions:

Providing Communication Research Experience to Future Professionals While Addressing
Virginia Sea Grant (VASG) Audience Assessment Needs

Produced for Virginia Sea Grant

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The original intent of this project, simply put, was to examining the challenges in communicating the goals, mission, and values of Virginia Sea Grant (VASG) to its partner institutions (i.e., universities in Virginia). Previous studies focus on civic administrators and concerned coastal citizens (Durant, 2012), and coastal resource management professionals (Olson, 2013). The focus of this project, and continuing with the successful working relationship between George Mason University (GMU) and VASG, was to expand the audience segmentation research into the academic institutions throughout the state. Initially there were two questions about Virginia universities motivating this research: (1) their awareness of VASG; and (2) their likelihood of responding to messaging that appeals to these institutions. These questions arose because VASG administrators noted that university-affiliated individuals receiving VASG-funded services or attending VASG events do not always connect those services to VASG, but instead to the partner leading those services. In addition, individuals at partner universities may or may not be aware they are part of a Sea Grant university, leading to a lack of awareness about potential research opportunities.

In March 2015, the intent of the project changed to addressing the role of multidisciplinary research among faculty members across the spectrum: within department; within university; inter-university; university to public; and university to end-user. As a result, this project had a two-fold goal: 1) to understand the barriers and challenges to multidisciplinary collaboration across VASG partner institutions and 2) to determine possible ways that VASG could become a connector and foster multidisciplinary collaborations across partner universities.

Method

VASG provided names for 88 faculty members at the five partner universities (GMU, ODU, UVA, VCU, VT), targeted for research interests or department affiliation. Recruitment emails were sent out to all potential participants in June (Table 1). The researchers devised a focus group script (Appendix 1) and ran a pilot test with four faculty members at GMU on June 15, 2015. Follow-up emails were sent two weeks after the original email in late June. Originally, the intent was to conduct in-person focus groups at each partner institution. The unavailability of the participants, due in large part to the summer session, altered the plan to a virtual focus group. Researchers utilized the Mason Telepresence System – a virtual meeting software – to conduct the interviews. Two focus groups were held: July 21 (6 participants) and July 30 (3 participants). Focus group sessions were recorded. The video files were saved and sent to an outside vendor for transcription. Transcripts (Appendix 2) were delivered in August and data analysis was conducted in September.

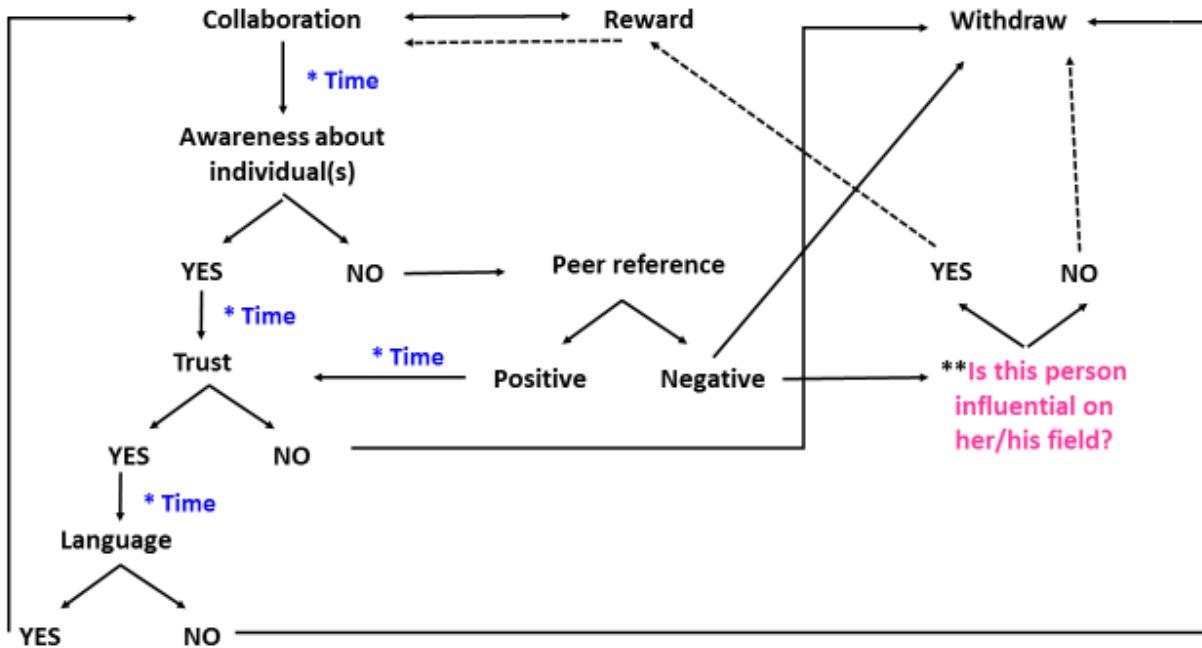
Results

All participants in the focus groups identified similar issues throughout the decision-making process that would lead to an interest in collaboration. To synthesize these topics, we created Figure 1, “Pathway Toward Multidisciplinary Collaboration.”. By no means is this a logic table, a linear progression, or a step-by-step protocol, but the issues highlighted in this figure were identified by every participant in all three focus groups. The common themes are highlighted in Figure 1, and will be covered in the appropriate sub-sections of this report (summarized as comments concerning peer awareness, language, peer reference, reward, time, and trust).

Table 1. Focus Group Demographics.

		Targeted	Participated
Sex	Male	55	10
	Female	33	3
University	George Mason University	14	4
	Old Dominion University	16	2
	University of Virginia	17	4
	Virginia Commonwealth University	15	1
	Virginia Tech	26	2
Category	Traditional VASG	24	3
	Engineering	19	3
	Policy Sciences	16	3
	Other	29	4
Department	Biological Systems Engineering	4	0
	Biology	1	0
	Business	1	0
	Chemical & Life Science Engineering	1	1
	Civil & Environmental Engineering	10	1
	Commerce	2	1
	Community & Environmental Health	2	1
	Community & Mental Health Systems	1	0
	Crop & Soil Environmental Sciences	4	0
	Economics	3	0
	Environmental & Sustainability Studies	1	0
	Environmental & Water Resources Engineering	11	3
	Environmental Science & Policy	4	2
	Environmental Sciences	7	2
	Environmental Studies	7	1
	Finance, Insurance, & Real Estate	1	0
	Forest Resources & Environmental Conservation	9	0
	Geography & Information Science	1	0
	Law	1	0
	Leadership & Public Policy	2	1
	Marketing	6	0
	Mechanical & Nuclear Engineering	2	0
	Ocean, Earth, & Atmospheric Sciences	4	0
	Political Science & Geography	1	0
	Public Service	1	0
	Sociology	1	0
Faculty Position	Associate Professor	50	5
	Assistant Professor	32	6
	Research Associate Professor	5	2
	Research Assistant Professor	1	0

Figure 1. Pathway Toward Multidisciplinary Collaboration.



** Note: This part of the “pathway” is the only one who was not determined based on the information gathered from the focus groups interviews. The outcome here is based on the researcher’s predictions of how the decision process would occur.

In general, participants acknowledged the usefulness of and need for multidisciplinary research in academia and the significance of broad impact results from multidisciplinary research. Each said his or her department had a stance on the concept of multidisciplinary research – whether due to disciplinary or university-wide initiatives. However, participants were also concerned about the long-term viability of multidisciplinary initiatives. As one participant stated “so many efforts made by so many major research universities throughout the U.S., in my observation, many programs have been suspended.”

Perceived Negative and Positive Aspects of Multidisciplinary Collaborations

When asked “what specific challenges do you experience when making connections that would lead to collaborative efforts,” participants described their own personal mental models for evaluating any research proposal and the challenges of managing multidisciplinary work along

with activities in their own fields. The participants' opinions of collaboration were informed by past experiences, and as such, were both encouraging and skeptical.

One participant, relatively new to the profession, expressed skepticism: "I've been involved in a number of projects that had a lot of multidisciplinary spin to them and they kind of fizzled out," and later discussed the ramifications of a failed project as "it costs different researchers different things to have an interdisciplinary project not work out." Another participant also provided a glimpse into past negative experiences: "Those kinds of collaborations are really hard to initiate and once initiated it's truly based on personalities. If you get along with each other, you find the time to understand each other and give each other credit. If you don't get along, even one person can poison the entire pool, and that is sort of a sad experience but it happens repeatedly."

Moving beyond past experiences, and attempting to target identifiable challenges, one participant mentioned a list of initial obstacles: "for me, the three things that immediately come to mind are institutional priorities, shared language, and sort of overconfidence about one's own abilities to communicate in other areas." Another participant brought up the challenge of physical location as a barrier, relating proximity to "multidisciplinary think tanks" and having distance not necessarily take away from a project but hinder the opportunity to engage in future projects.

While hindsight on a failed project leads to scrutiny, there was a sense of encouragement at the idea of multidisciplinary collaboration and the conceptual validity of utilizing a broader stroke to create scientific advancement. One participant, from the business field, stated "the quality of interdisciplinary research, in my opinion, is where we get the enormous breakthroughs." Another participant, from the sciences, acknowledged the importance of

multidisciplinary focus in academia: “we’ve been aware for like a decade about the importance of the network kind of system.”

With that said, most of the participants in the focus groups identified the negative aspects of collaboration and the steps necessary to succeed were based on the ability to move beyond the comfort zone: “that’s why we constantly hit this kind of roadblock when it comes to multidisciplinary collaboration or interdisciplinary collaboration because at the end of the day, of course everybody feels comfortable just talking with their own folks, going to their own conference, doing the work the way that they’ve been trained to do.”

Factors Affecting Multidisciplinary Collaboration

Time. Unanimously, time was an important factor. Participants often cited time as an intervening issue but not a primary issue of concern. That does not take away the impact, however, as it was the one factor that overrides all other facets of the decision-making process. Based on the information gathered in all three focus groups interviews, we noticed that time intervenes at all levels: time to conduct new research; time to gain knowledge of research partners; time to initiate/build relationships; time to develop trust; time to learn new or technical languages; and time relative to rewards (e.g., return on investment) (Figure 1).

One participant discussed the significance of time succinctly: “I compare the benefits and costs of what I’m doing and the benefit is a professional research upside, and my most constrained resource at the moment is time. So I think very carefully about the amount of time it’s going to take.” In the subsequent sections, time will be mentioned in relation to the factors leading towards collaboration. In Figure 1, time was represented at each decision in the pathway. Due to the individualistic and subjective nature of time, there was no consensus amount required during each path in the model. As one participant noted, the success of any collaboration requires

effort: “for somebody who’s going to be successful at that, they’re going to have to put in the time to try to gain a basic understanding of what’s going on with that other field.”

Reward. The concept of reward was mostly discussed in terms of a system for compensation (i.e., monetary benefits); professional recognition (i.e., publications); and employment security (i.e., tenure). However, on a few occasions, personal satisfaction and outreach were also cited as being a reward when engaging in multidisciplinary collaboration. Participants discussed the relative difficulty of multidisciplinary research, in terms of requiring more resources at the beginning of a project, and that information should be known in advance during the proposal phase. “I think that the environment and the reward system relative to your research objectives, it’s absolutely critical that it be embraced,” one participant stated.

Participants noted the lengthy nature of multidisciplinary research and how that could alter the perception of individual accomplishment, especially when it comes to departmental evaluations. Several participants mentioned the workload of faculty (i.e., teaching, research, service) does not allow for case-specific evaluation: “there is no...anything like written words, any type of the reward system that really supports or truly rewards your efforts made for collaborative work. So even though you don’t do any do collaborative work, you get the same evaluation.” Another participant took this issue further: “without the actual publication, it’s just a bunch of activities.”

Other participants discussed reward compared to costs: “if the reward or the interest isn’t there in the long run, that’s a cost that gets charged against the project.” This is also true for funding entities (e.g., government agencies; grant-funded researchers). If the “project manager” or “funder” requires bottom- line production or if they are integrated throughout the process, participants indicated the project is more apt to be successful and lead to publication.

Awareness and Peer Reference. When asked to explain successful research collaborations, participants often cited the professional or personal knowledge of individuals as leading towards positive experiences. Participants acknowledged they rarely, if ever, reach out to strangers without conducting a brief background check. For most participants, their preferred method was through traditional friend-of-friend type connections. One participant eloquently stated this idea: "I think if somebody that I trust trusts somebody, then that means something to me. If I don't know somebody at all, and I don't know anybody that I trust who knows that person, then it would depend on the interaction that I have." Another participant agreed: "it's got to be somebody who knows somebody. The almost random type of scattershot approach of looking up somebody just based on their qualifications and approaching them without getting some input from somebody else who is somewhat familiar with that person is risky."

In addition to the interpersonal vetting process, and harking back to the discussion of distance as a barrier, many participants noted the apparently antiquated method of informal workplace and community building efforts. One participant, working remotely from the university department at a research site, stated the importance of interaction: "we have this community, that community, but not interacting because they truly are not understanding the culture, whole backgrounds of each other or not making that much of the effort, or there is no facilitating process or procedure to get them to interact." The participant suggested almost accidental interactions are essential in building a workplace community – but they also lead to research opportunity. He continued: "I will say that I do 90% of my work with colleagues at other universities, and the way those connections were made is just through the day-to-day course of professional life." These informal gatherings can lead to improved relationships but also increased knowledge and research breakthroughs. For example, one participant commented:

“Some of the top schools would have a time when people would come to eat together, but you would not sit at the table with your peers in your department, but you may sit with people from other disciplines. And it’s designed to encourage this free creativity and discussion and sharing as to what’s going on in your field. That spark of “Aha,” okay, “I know what they’re talking about, but in my field, it’s this,” okay? “We call it that,” okay? And it’s a whole body of research there. It’s incredible what comes out of that and all of a sudden, major breakthroughs occur.”

Despite advances in technology, including the virtual focus groups utilized in this study, all participants stated a preference to have met in-person, either “at a conference, a professional conference, and feel as though I actually have some personal connection with the person.” These connections, whether achieved in formal or informal settings, lead to trust and improve multidisciplinary collaboration.

Trust. Trust was cited as a prerequisite for any successful project. Participants seemed to refer to trust in the quality of potential deliverables on a research project or trust in the ability of collaborators to produce a good product. As one participant stated, “there’s got to be a certain amount of trust among the researchers and it’s hard, especially when you’re first getting started, for that to be there. But the successful ones for me that have worked out pretty well, I trust those people completely that they are experts in their field and they’re going to deliver what they promise.” The participant went on to discuss the pitfalls of unsuccessful collaboration and trust: “I’ve done a couple interdisciplinary ones where basically people did not deliver what they promised and it’s not an area that I could – no matter how much time I wanted to put in – kind of correct for that. So over time, there’s got to be a level of trust that develops between the collaborators.”

The idea of trust was not just a concern at the beginning of a research project, but also had long term ramifications for future opportunities. As one participant noted: “I don't know somebody at all, and I don't know anybody that I trust who knows that person, then it would depend on the interaction that I have. And I would say that if I was collaborating with somebody and they didn't deliver within reason on what they promised, I would probably never collaborate with them again.” Gaining this trust, however, was not simply acquiring knowledge about an individual. One participant commented on overt efforts by his institution to encourage multidisciplinary collaboration: “As a relatively new faculty member, that's where I've learned to be skeptical pretty quickly. You know, my university and then other types of institutions, they do think about trying to introduce you to, who you might work effectively with. And those kind of spoon-fed collaboration have usually, in my case, been the ones that didn't go anywhere.”

The establishment of relationships and trust was linked to success through the experiences shared by the participants. These experiences can also occur via social media but were not as significant, in the participants' views, as face-to-face interactions. One participant that frequently uses social media stated “I think on the surface and maybe on the intermediate level, that social media has a place to play, but when it comes to those significant breakthroughs, people are going to hold the ideas close their chest until they ultimately get published.”

Language. Many of issues discussed were more interpretive in nature, lacking a fixed measurement or evaluation. One of the topics brought up that had a more technical leaning was that of language. Participants mentioned issues related to understanding technical language (i.e., theory, glossary); informal language (i.e., jargon, lingo); and spoken language (i.e., English as second language). Five of the participants spoke English as a second language, but the first discussion was of technical language. One participant noted the necessity of being on the same

page: “it’s to find the common language, so sometimes you end up talking with a very technical language that somebody in a different field wouldn’t understand, and the same thing goes for somebody in a different field speaking a language that I cannot understand.”

It was understood that multiple disciplines will have different viewpoints, conceptual frameworks, working theories, and technical languages. All participants discussed the upward slope of shared knowledge, and how that improves over time. A participant, on discussing the challenges, highlighted certain conflicts: “you stick to the language and then until you really achieve that level of, like a certain command of that particular language, you bump into such-- so many different situations where you get misunderstood or you misunderstand what other people saying, in that particular foreign language, language that is foreign to you. So, but we’re using already so many languages that are foreign to us professionally, because we have developed that way over the centuries.” These communication breakdowns can also occur, even when the mission is shared. As one participant noted: “we use a very specific type of language and often I think people with different training and different disciplinary background really do have very similar interests and priorities and yet when they attempt to talk about those issues they’re using different lingo and different jargon which can make those communications challenging.”

All participants suggested throughout the interview (especially true when engaging in dialogue with their peers), that effective collaborations are somewhat rare and often problematic. But when they occur, they do so because key collaborators are both highly trusted and highly competent researchers, who can be relied on to move a project from the idea state to a publication. Participants also suggested the value of face-to-face interactions cannot be understated, and those interactions often lead to increased trust in fellow researchers.

Conclusion

During its early development phase, this project was intended to identify the challenges faced by VASG in communicating the goals, mission and values to its partner institutions. This initial goal, however, evolved from increasing awareness (i.e., determining how to increase awareness about VASG to partner institutions) to fostering multidisciplinary collaboration (i.e., how can VASG become a research connector across its partner institutions). The results obtained by the focus groups interviews helped to shed light on perceived benefits and challenges regarding multidisciplinary collaboration. In addition, the focus group interviews provided insight into factors used by faculty during the decision-making process prior to engaging in multidisciplinary collaboration.

Figure 1 was developed after the interview transcripts were coded, highlighting emergent themes affecting multidisciplinary collaboration. It is important to note that while the themes appear in a specific order, participants did not mention those themes in that order. The progression of the pathway should not be considered as a step-by step protocol, but simply as an organizational way to demonstrate and discuss the common themes mentioned by participants in all three focus group interviews.

Most importantly, the concept of time was a recurrent theme throughout the interviews, playing a significant (and primary) role in the decision to collaborate. Time was not limited to availability in terms of hours necessary to complete the project; but was an intervening factor at every concept in the process. Intuitively, awareness about potential collaborators (i.e., individuals in different but overlapping fields; individuals in the same field at different universities) was among the first themes cited. The degree of awareness about an individual is dependent on time (i.e., length of relationship), and consequently, the amount of time required to “get to know” a potential collaborator influences the development of trust. This “vetting process”

occurs informally or formally, with first or second hand (i.e., friend of friend) knowledge of any potential collaborator. Without the establishment of trust, researchers will most likely withdraw from the activity or project.

Language was another theme that emerged as playing a role in the development of multidisciplinary collaboration. The lack of a shared language, either technical or native, requires a steep learning curve. If trust has been established, faculty would be more inclined to invest the time necessary to learn the language and eliminate the challenge of misunderstanding. This entanglement between time, awareness, trust and language can be observed in the quote below:

“But anyway, so you know, being able to get along together and communicating somewhat. You know, I collaborate with molecular biologists and microbiologists and others and you know, as long as you can understand some of that, you know, what’s going on, I certainly don’t understand everything that goes on in those fields, but that takes work. And so for somebody who’s going to be successful at that, they’re going to have to put it in the time to, you know, try to gain a basic understanding of what’s going on with that other field.”

Moreover, the obtained reward (i.e., publications, grants, professional recognition) will serve as a positive feedback loop, playing a role in stimulating future collaborations with the same individual(s).

Finally, we could also determine that in situations where faculty had no knowledge about a potential collaborator (no awareness), trusting in a peer’s judgement of that potential collaborator is the preferred choice. For all participants, a peer’s positive or negative review of the potential collaborator was enough to decide if they would engage [or not] in collaboration with a stranger. As a participant explained:

“I would just also add that – and I don't know if folks have had this experience also – but you know, there are some folks out there that might have this skill set that you're looking for, but oftentimes there's more than one person. And if someone is a really difficult person to work with, sometimes I would expect, at least for me anyway, that you sort of try to avoid those people. Because you certainly don't want to introduce somebody into your project who is toxic, has a toxic personality, and could end up making the project very unproductive.”

The same participant continued with the following:

“But that's one of the beauties of having an informal network is, you know, somebody might be a world renowned whatever, epidemiologist, and so and so, but if you're talking to somebody you trust and they say, “Man, that person is just impossible to work with,” that's certainly going to be a consideration of whether you reach out to the person to see if they can be part of a project or not.”

During data analysis the researchers questioned if the decision of not collaborating with a “stranger” – given negative peer-review – could be affected by the level of influence said “stranger” had on its field (i.e., high number of publications, grant money). In this circumstance, researchers believe the potential reward of working with someone very influential, despite the negative peer review, might be the driving force behind collaboration. As a caveat, the level of influence of a known scholar is simply an assumption on the part of the researchers and was raised during data analysis, but was not discussed with the participants during the interviews.

Recommendations

The themes identified in this report (time, awareness, trust, language, peer reference and reward) and the interaction between/across themes were described in the results and conclusions

section. A summary of the thematic relationship can be seen in Figure 1. There is an inherent decision-making process, exhibited by the relationship between the themes, leading towards any multidisciplinary or interdisciplinary collaboration. It is important to highlight the understated or “hidden” theme of interpersonal communication and relationship as a driver of collaboration.

Although not verbally stated by participants, interpersonal communication (i.e., “the exchange of verbal and nonverbal messages, between two people, with the intent of influencing one another, usually to manage a relationship”) (Beebe, Beebe, & Ivy, 2013)¹ was observed to be the main force leading faculty to attempt multidisciplinary collaboration. In a sense, the process of collaboration itself is dependent on interpersonal communication in order to establish a collaborative relationship. As one participant clearly summarized:

“Those kinds of collaborations are really hard to initiate and once initiated it’s truly based on personalities. If you get along with each other you find the time to understand each other and give each other credit. If you don’t get along, even one person can poison the entire pool and that is sort of a sad experience but it happens repeatedly.”

When participants were asked if there was an organization that wanted to assist in making these connections, what would be required, participants stated comments consistent with the findings listed above and with a common theme of information overload. On the topic of e-mail, one participant stated: “I don’t see sort of another mailing list. My e-mail fills up with it now. They’re sort of at the background noise level there.” Another participant noted the effort required to filter out the information from an outside connector, stating ““Yeah. But then again, that might take up more of our time to have to field things coming in from such an organization and just making decisions about whether to work with somebody or not.” And finally, another participant

¹ Beebe, S. A., Beebe, S. J., & Ivy, D. I. (2013). *Communication: Principles for a Lifetime*. New York: Pearson.

discussed the importance of interpersonal relationships even with information from an outside connector:

“I kind of recognize, yeah. It’s just another center or institution saying that, we’re so organized to help you.” But then, right, we already have expert assistance on the field, is probably every field we participated in. And then you can easily pull somebody, because you already know somebody or – it’s even not a six degrees of separation. We know somebody who knows somebody so we can, usually that’s how you find your collaborators and if you need some networks together instead of just meeting a stranger. It doesn’t happen that way in the real world.”

Further, one participant noted the discrepancy between those that conduct research and those that fund research:

“I think that some of the well-intentioned people whose job it is to kind of create some sort of infrastructure and network, for example, for faculty at a common university to utilize, I don’t think they tend to be successful researchers with a track records of grants and publications and might be a little bit naive about what it’s going to take down the pike to get a good paper out. You know, those things kind of boil down at the end of the day to, are you willing to stay up until the wee hours of the morning and get this done. And I don’t think people are usually willing to do that for the projects that aren’t really, really the most core important things for them.”

The results also suggested that in order to be positioned as a connector between partner institutions and foster multidisciplinary collaborations, VASG should avoid “passive routes” like simply creating a database containing background information on affiliated researchers or devising new e-mail distribution lists. Participants felt that a more active route, such as creating a

medium where interpersonal relationships can develop, could lead VASG to be more successful, and efficient, in fostering multidisciplinary collaborations. This idea of an active role creating a medium was described by different researchers in the statements below:

“Every time I go to like conferences in Europe, they all have tea times and then somehow they have a place people can gather, even very small moment in the afternoon and then somebody is going to just, “Okay, this is all the slide that I just got from the field trip to Africa somewhere,” so it is, “Look at this,” and then somebody, “I just came from Arctic, okay, look at this.” So they have things to talk about and look at it, then sometimes it’s a faculty and the faculty is there, the students is naturally there, come and go, you don’t have to stay like for four hour or two hours.”

“You can see what they’re eating, you can smell the perfume they’re wearing and you can decide whether you like this person or not, do they have bad body odor or what? Those human interactions, at a distance, are difficult do to and I find the best collaborations are when you can actually meet a couple of times. Sometimes that means I have to drive 250 miles to Blacksburg and, even one or two meetings really enhances that work you can do together particularly when you’ve brought in one or two new individuals to the team. When you’ve got people who’ve worked with each other for years, that’s not a problem, but when you bring in a couple of new individuals it’s very helpful to get them sort of inculcated in the group dynamics, how does this group function. Each group is different.”

In sum, it is important to identify the key stakeholders that have already been successful in multidisciplinary research; have an awareness of the mission and values of VASG and the importance of continued scientific advancement; and are well positioned professionally and

academically. With so much focus placed at the individual level, it seems logical to suggest emboldening the researchers that have the ability, time, and desire to promote the goals of Virginia Sea Grant; fostering the relationships to make connections; and providing resources for those two activities to succeed.

Appendix 1: Focus Group Script

Introduction: 10 minutes

Before we begin, we would like to make sure you have received and read over the consent form for this research project. [Collect signed documents or disperse hard copies]. As you have read, we are going to be recording this focus group, so unless you have any issues or comments, we are going to begin to record now.

[Begin Recording]

[RESEARCHER NOTE: opening statements (anecdotal ice breaker, thanking for time, etc...) will be used to get everyone settled in and comfortable.]

On a broad scale, we brought you here today to talk about collaboration in research. We do not want to define what that means for you, but we are hoping we can get your honest opinions on your research practices and any collaborative efforts from past/present/future.

More specifically, we are looking into ways in which collaboration in research can be improved. We'll ask you to share your experiences and help uncover the pitfalls and challenges. Our questions have been developed to allow a free-flowing conversation among you, so please feel free to express yourself and go into detail.

As academics we are sure you are familiar with this type of setting. Run time is approximately 2 hours.

Themes:**Multidisciplinary Collaboration** 15 minutes

- What specific challenges to you experience when making connections that would lead to collaborative efforts?
 - Specifics:
 - Time
 - Meetings?
 - Impromptu or scheduled
 - Information overload
 - Institutional job duties/responsibilities
 - Communication method(s)
 - Email/telephone
 - Probes
 - How well does this meet your need for making contacts and connections?
 - What about this works for you?
 - What about this doesn't work for you?

- How effective is this for you?

[RESEARCHER NOTE: It will be likely that participants will discuss a research partner at another institution during the discussion for our first theme. Make note of this, and use this as a reference point taking the conversation towards a cross-institutional theme.]

Cross-Institutional Collaboration:

20 minutes

- How do you make connections with researchers at other institutions?
 - Probes:
 - Professional Conference/Organizations/Affiliations
 - Personal
 - Research Specific Interest
 - Acquire knowledge of an individual sharing similar researcher interests and contact them. Vice-versa?

[RESEARCHER NOTE: Here we are trying to get the participants to open up about the methods used when establishing connections for collaborative efforts. As we have discussed, this could be based on any number of factors, but gets into interpersonal communication efforts. This could be an area where the conversation goes off tracks, so it will be crucial to have controls in place to get it back to the theme of cross-institutional collaboration.]

- In retrospect, what worked (or did not work) in your collaboration efforts and what would you change (improve) for future attempts?
 - Probes:
 - Methods
 - Type of Research
 - Responsibilities

End-user Collaboration:

20 minutes

[RESEARCHER NOTE: end-user, defined for our purposes, is any individual/institution/organization using the results of any research in conjunction with their mission (e.g., politicians, government officials, advocacy groups). It may be necessary to clarify this to the participants. It does not include other academic researchers.]

- How important is it for you to collaborate with individuals who will use their research to make decisions?
 - Probes:
 - If so, more than just discussing the research findings. Could it lead to refining any ongoing research questions taking into account the feedback from the end-user community?
 - If not, is it more than lack of application? Is there a communication channel issue?

[RESEARCHER NOTE: This line of question will lead the participants to begin to think about ways in which their collaborative efforts could be improved. We will transition into a more theoretical discussion of “how” things could be improved or any relevant topics.]

Virginia Sea Grant: 50 minutes

- If there was an organization that wanted to help with you make connections for collaborative research, how would you feel about that? Do you utilize any such organizations?
 - Probes:
 - What would they want.
 - How would they like to interact with the organization?
 - What information would you want?
 - How would you like to receive it?
 - What are the most important problems discussed that this organization should address?
 - If you were asked to design a program, what would it include?
 - What are potential pitfalls or concerns, or apprehensions?

[RESEARCHER NOTE: This will likely get a conversation going that deals with information access and retrieval. For our purposes, we have not outlined any specific or technical questions related to this process. It could be that we find this is where the most ground could be gained for future focus groups beyond the pilot.]

Closing Statements: 5 minutes

That about wraps up our time for today, but before we go is there anything else that you have wanted to discuss that we did not get a chance to during our conversation? If you happen to think of anything you would like to add or revise, please do not hesitate to contact us at

[provide contact information on a sheet and handout]

We would like to thank you for taking your time out to assist us with these very relevant and important issues of researcher collaboration.

[End Recording].

Appendix 2
Focus Group Transcript June 15, 2015

GMU MISC 8 JUNE 15

MALE MODERATOR: Thanks, man.

FEMALE MODERATOR: Thank you.

MALE MODERATOR: Yeah. So, I'm going to apologize in advance. There's some stuff here structured that I'm going to read, so it's going to sound formal because that's the way we've written up some of the questions. So if it seems like I'm reading off of a page, I am, but that's not going to be the entire universe of what we will talk about, so we're going to dive into things if we find them interesting or not, so I just want to get that caveat upfront.

So with that, I'm just going to give you the spiel. On a broad scale, we already know what we're talking about, we-- to talk about collaboration and research. We don't want to define what that means for you, we'll let you do that. But we're hoping we can get your honest opinions on what research practices and any collaborative efforts that you've done in the past that you're currently doing or that you want to do in the future. More specifically that that, we're looking into ways in which collaboration and research can be improved. Sharing experience, we want you to do that, trying to help uncover the pitfalls and challenges that go along in collaborating and research. And so our questions have been developed to allow this free-flowing conversation, express whatever it is that you feel that you want to and go into detail please. The detail is where it's at for us. And so as academics – and everyone here is familiar with this, I would hope so. I think we are probably on the lower end of experience in terms of conducting these kind of things. So we're looking at 1-1/2 to 2 hours, but it all depends on how much input you want. So that's our opening spiel. Bea?

FEMALE MODERATOR: Okay. So our first question to you all is, what specific challenge you experience when making connections that would lead to collaborative efforts?

SPEAKER #1: Challenge you say?

FEMALE MODERATOR: Mm-hmm.

SPEAKER #1: Okay.

MALE MODERATOR: And a lot of time, you know, if you're making connections that-- we're focusing on that at the front end of this. We can go a number of ways with that, but...

SPEAKER #2: The only challenge making connections for me has been, I'm able to make connections and then it's, you know, finding collaborators who have the time to participate in research. And the collaborators could be faculty or it could be at an agency, a state or federal agency, or it could be graduate students, even undergraduate students and you know, it's important to be sure that everybody has time. I know that I'm not a good collaborator in some respect, because I get involved in things and I don't have time to see things through as much as --

as well as I would like to do.

So, I should also add that I also have multidisciplinary background because after getting my doctorate and then doing post docs, I ended up in an environmental consulting company for a number of years before I ended up with Mason. And I ended up here because I happened to meet one of the professors who was helping me to teach course – well, he was going to be one of my first students in the course that I was offering, and then I realized I didn't know much about his specialty, and I asked him if he might help teach that part of the course and he agreed to, and then we taught together for a number of years after that. So, he helped bring me to Mason because he said there was a need for my expertise here, but, you know, so that worked out until, you know, again, trying to make the time for everything, we had to-- we had to kind of stop that collaboration. So I don't know, that's my main challenge.

SPEAKER #1: So for me, I think like the most important – there are four – but it's to find the common language, so sometimes you end up talking with a very technical language that somebody in a different field wouldn't understand, and the same thing goes for somebody in a different field speaking a language that I cannot understand. So sometimes I just end up collaborating with experts in the same field, so, even though we are-- we have senior expertise, we focus on different, you know, on a very specific aspect of the problem, but at the end of the day we are all either engineers or I mean, like I do a lot of water research and engineering and remote sensing, so I end up collaborating with people from the geography departments that do remote sensing, but really we are in different departments but at the end of the day we do the same thing. So that's one of the, I think the challenges that I encountered in this past couple of years. Let other people speak, but I may add something later.

SPEAKER #3: You can--

SPEAKER #1: No, go ahead.

SPEAKER #3: Basically, in my experiences, I kind of talked about this in my talk too. I myself very [inaudible] interdisciplinary trained throughout the [inaudible] in all the teachings and stuff. I'm kind of half scientist, half engineer. I call myself ecological engineer and working for the [inaudible] but it's, you know, we even took a field trip to a landfill one day, we've got some folks from civil engineering. I'm affiliated with the civil engineering department although I base on environmental science and policy, and I work with also molecular biologists as well to bring their different printing techniques to study like microorganisms that plays the role in cleaning the water in the wetland system. So I collaborate really across the boundaries, but if one asks me if you want to continue to collaborate with the people, you know, completely outside of your comfort zone like that, I would say no. Why? Because I'm just kind of [inaudible] if I say this, but it's really, really difficult. It's just-- it's more than just saying, "Oh, here's a different languages and different way of doing it." You're not-- first of all, you're not comfortable with people who have different backgrounds and training, first of all. You know, we all speak different languages. You're from [inaudible], so you know this, because I'm from Korea so I know this, I mean at a personal level. You stick to the language and then until you really achieve that level of, like a certain command of that particular language, you bump into such-- so many different situations where you get misunderstood or you misunderstand what other people

saying, in that particular foreign language, language that is foreign to you. So, but we're using already so many language that are foreign to us professional, because we have developed that way over the centuries.

So it's very difficult to-- we have this kind of bumps or like sort of moments in mid-90s, like every college and university in the States were talking about multidisciplinary, not enough interdisciplinary, not enough trans-disciplinary, yeah we've been doing that. But I can't really pick one particularly successful program that really provides like almost like encyclopedic sort of like a guideline that you can just pull and apply to create a program that is really working interdisciplinary way, you know, on a college campus or not. Because at the end, so many efforts made by so many major research universities in throughout the United States, in my observation, many programs has been suspended.

Usually they would say that it's due to lack of the funding, yeah that's true, but there is also other reasons behind. It's so hard to pull this people together, even put them in one room. Probably while you're working on this project you already noticed without me saying about this, so I mean, I know provost is now starting this whole multidisciplinary symposium, he held one and then tried to put people together. It's chaos. I mean it's chaotic situation that we have to go through to get to some-- get to where we can see some kind of order, where I can see-- I mean if it is really well done, we might be able to see the emergence of the order that can be translated into this really highly productive interdisciplinary or multidisciplinary collaboration. But I think it requires like a really huge amount of sort of motivation, whether it is by funding or whether it is by some kind of facilitating kind of force given by the administration or other forces from externally to push this forward. Otherwise, one day we sit in the same room and talk about what we do, each one of us, but until we really get to know at the very personal level, that particular level of collaboration is not going to happen. That's my opinion, yeah, and sometimes I just said this so, like a, you know, clear cut like this, so maybe this, so [inaudible] maybe about this, but, you know, I'm still collaborating. I'm collaborating engineers, collaborating microbiologists, and then even artists. I created the-- I founded the eco-arts, eco science plus arts initiative. We've been doing that for a couple of years now. And then we're developing some more proposal with some of the people from performing art and then also humanities as well.

It's quite challenging because I personally like the challenge and then somewhat get motivated by the challenge that's why I pursue it, but at the same time, based on my experiences, I want to say, just my own opinion, but to anyone who is interested in collaboration across the boundaries, we want to really check because everybody's time is limited and then without like enough time and resources given to you, it's very hard because it's already hard to your own thing, to begin with, and then you have to crossover to talk to another which involves like mutual efforts, time and efforts, everything. Who is going to really help facilitate that? So I think-- that's why we constantly hit this kind of roadblock when it comes to multidisciplinary collaboration or interdisciplinary collaboration because at the end of the day, of course everybody feel like comfortable just talking with their own folks, going to their own conference, you know, doing the work the way that they've been trained to do. So how to get out of that? It's really getting out of your comfort zone. I know only then we can make some kind of progress, but this is comfort zone, this is uncomfortable zone, but that's where the magic happens, but how we go there which is-- somebody has to, somebody has to provide that much energy to people in their

comfort zone to be able to get out of there to go somewhere else to collaborate, so I think yeah – but the people in the comfort zone may not be able to do that by themselves because it's not like -- it's a system, so it needs a kind of energy to get activated and then to move forward and that is difficult, so. Does that even make sense?

SPEAKER #4: Well, everything I've heard makes a lot of sense. For me, I've done most of my research as multidisciplinary. But I need to publish and marketing, but a critical component even here at Mason at such a short period of time, a project that I do with engineer here, is just a natural for me given what I've done in the past. So we have a paper, okay, this is a marketing paper – for once out of the team – so I found it very beneficial here at Mason to be able to do things under the heading of “marketing” when I’m doing interdisciplinary work. In prior assignments however, smaller schools are very departmentally oriented and the resources are extremely limited. And there, the benefit from interdisciplinary research would be vast, okay, because you can get a synergy going, but the reward system is not toward interdisciplinary. Recent changes in accreditation standards for business, I think – well AAC is big – will lend itself to more of that kind of interdisciplinary research, which now is considered – if approved by the school of business – to be appropriate research publication for your intellectual contributions.

So, I think that the environment and the reward system relative to your research objectives, it's absolutely critical that it be embraced. Now, the quality of interdisciplinary research, in my opinion, is where we get the enormous breakthroughs. And historically, some of the top schools would have a time when people would come to eat together, but you would not sit at the table with your peers in your department, but you may sit with people from other disciplines. And it's designed to encourage this free creativity and discussion and sharing as to what's going on in your field. That spark of “Aha,” okay, “I know what they’re talking about, but in my field, it’s this,” okay? “We call it that,” okay? And it’s a whole body of research there. It’s incredible what comes out of that and all of a sudden, major breakthroughs occur. So I’m a strong proponent of interdisciplinary research and our research area is STEM: science, technology, engineering and math. I have a great deal of difficulty getting my papers even looked at in business school, even though the top businesses in-- CSR, corporate social responsibility, every major corporation has a huge initiative in that area. So, gradually we’re coming around to understanding the importance of that relative to workforce.

MALE MODERATOR: Okay.

SPEAKER #4: It’s a slow process. But in industry, cross-functional teams are critical, and I’ve served as a project manager for years and working with cross-functional teams. I think we do a great job with that with our student here in Mason. In business, I think we do a terrific job, so teamwork is I think where it’s at.

SPEAKER #2: Yeah.

SPEAKER #4: That’s why I’m here [laughter], to help you all.

MALE MODERATOR: So.

SPEAKER #2: Yeah, it's important to have collaborators that work well together as a team. I've had some outstanding collaborations with people I've never met. On the other hand, I've had collaborations with some people that I'd rather I never had met [laughter]. So --

FEMALE MODERATOR: Raph and I hate each other.

SPEAKER #2: Well that's--

SPEAKER #3: Well that's already the sign. You hate each other, you have potential to collaborate, so.

MALE MODERATOR: Just as long as I don't have to drive her to and from school every day.

SPEAKER #2: But anyway, so you know, being able to get along together and communicating somewhat. You know, I collaborate with molecular biologists and microbiologists and others and you know, as long as you can understand some of that, you know, what's going on, I certainly don't understand everything that goes on in those fields, but that takes work. And so for somebody who's going to be successful at that, they're going to have to put it in the time to, you know, try to gain a basic understanding of what's going on with that other field.

You know, I'm a member of the American Association for the Advancement of Science, and I read *Science*, the journal, all the time. I still can't pronounce all the words and some of the titles because that's what I was-- put me off from that originally when I was an undergrad [laughter] but it does give me ideas about the broader world that we live in and trying to find new ideas and connections and things, but it takes, you know, more work to do that instead of just reading narrowly in your discipline kind of thing, so

GROUP: Yeah.

MALE MODERATOR: So I'm hearing a lot of different hang-ups in the lifecycle of a research idea. We have the beginning part of it where it's – whether or not you're aware that it's happening – because of understanding technical language or spoken language, if you will. Then if there is an initial agreeing there, like an idea that seems like people want to jump into it, then that's one starting point – but then there are other difficulties along the way, whether or not that's time, effort, money. You talked about reward systems--

GROUP: Yeah.

MALE MODERATOR: We're talking about there's a consistent roadblock that always occurs, and which one of these types of problems that we've all mentioned in one way or another is the one that is – how should I say this – which one is the most significant in terms of turning you off from wanting to put that extra effort in, that extra time, the extra interest in learning and understanding the other side.

SPEAKER #3: I hundred percent agree with her mentioning about the reward system and then the rigid structure that we're in right now, academically or professionally – because the whole system is developed like hierarchically. I mean we don't have-- somewhat, I mean we've been

aware for like a decade about this importance of the network kind of system, like a parallel sort of, not like a hierarchically. But still-- because I even, I studied ecosystem as a system in colleges so I kind of sort of like look at in my own field how the networks of the different organisms or plants and then how, what kind of complexity or degree of complexity that we have to be able to sustain to provide a certain services that nature provide us, either from cleaning the cleaning the water or remediating the big flood or hurricane, stuff like that. So, do we have to have certain or all different kind of communities here that can be made maybe more resistant to the natural disaster or disturbance or we have to have just one types of big forest or something to work as sort like a barrier for the big wind or hurricane, something like that.

So the same thing apply, I think the-- I was talking with some in the office that-- in social complexity center, we have one in the other campus. I don't know that's exactly name, center for social complexity, or something like that, there is a center on campus. So they were-- a lot of them are computer modelers working, you know, different agents, you know, different components of it, work together to produce a certain level of productivity of that system. I think that applies to a corporation or university or any entity you can think of. The-- currently the reward system, speaking of reward system, I mean the way I understood it is that yeah, we are all departmentalized, right? We get hired by our own department, we stayed in our department, we get tenured in our own department, not in-- even though you are encouraged to collaborate verbally, or you're not, sometimes they don't say anything. But I know, she's always nodding [laughter], we've all been there. So the thing is then -- like I said, with this structure, it's very hard to just jump over to another department and then reach out. We do that on a personal level, we have that experiences, because I think I'm sure all us, but then we learned how difficult sometimes it is to sustain or initiate or even continue that kind of collaboration from our [inaudible] you know, started it.

So, I think it might require transformation of the entire structure slowly, so that not too rigid or too morphous, like a little bit amorphous or a changeover kind of structure. If we can bring that in, or apply that into the sort of entire organization of that academic institution in such a way that would facilitate the communication or meeting. This is wacky idea of my own, but I'm going to say, because this you're talking about this communication. One time, it's just this year, in the last year, working on this [inaudible], first time that-- Twitter is the first time spoke to art people, humanities people. So I have this-- the director with the philosophy department, he came over to one of the events that we hosted and then we start by communicating through email and then he came over to my office one day. We kind of talked because he was so concerned about is community getting so developed with little regard to environmental protections or the natural park, kind of green areas there. So he was asking about, "Is there any other better sustainable way to go around it, or do you want to participate?" Blah, blah so we started this in the conversation -- is there a need for opportunities for student participation any graduate student project, stuff like that. And then we hit a roadblock -- there's no funding for, to hire graduate students to make this as attractive as, you know, any other, you know, funded project. You know, you're a graduate students, so you need funding. A lot of our graduate students are doing TA, having hard time or finding enough time to do their research, because TA work actually jacks up a lot of their time as we all know and then we don't really highly pay them and at the moment, unfortunately. So, if there is a project-- I'm like a huge advocate for supporting graduate students. If there's anything, any funding or any money there I can ask them to apply, I

work with them, stuff like that, but still that's not enough. So but then a lot of project-- because of the problem that we're facing already into this field, it's complex, very complexity to it, meaning that to even address the problem we need separate experience, and this is based on just this thinking of the separate disciplines to be able to understand the problem to begin with. So to come up with a solution for the problems, we all know intellectually it involves, okay, it involves engineering, it involves hydrologists, it involves [inaudible] experts, it involves botanists. We need all, yeah, microbiologists or we need historian because we're dealing with this event that has this kind of history, the recognition of the human sediment in water and the impact that we have made on the land.

So, how to make a decision or come up with any project, but someone who or some organization or can be any entity who design the project may not fully aware of the need for this kind of inter or multidisciplinary expertise to be considered at the very beginning, so they don't buzz it or create the sectors where other disciplines that are still necessarily, you know, should be considered as part of the sort of team to be created, but they don't. So, usually it started with just one or barely two disciplinary, you know, to tackle, to address of the problem. Along the way they find, we need that too, but then they don't have budget, because it's already half the way of the project. So project usually end up with a big report, we didn't know substantial outcome that can be immediately applicable to [inaudible]. I don't want to [inaudible] but this is-- happens so many times, that's why, yeah.

SPEAKER #2: I have noticed that there are, you know, there are people who can't grasp the, you know, the broad implications of a need for different disciplines. I've noticed a couple of comments that you received on your project that, "Well why did we have to have art involved?" With your environmental engineering and infrastructure improvements and everything, but so there are people out there who don't get that, so then they're not likely to provide the funding or the budget for that to begin with. So, that is definitely a problem. Did you want to say anything? Because I had something else to say [laughter]. I was going to bring up the problem about reward here that, I've been doing research all my life, almost since grade school [laughter]. Even while I was in environmental consulting I was collaborating with other scientists and we were getting projects done and papers published and everything, and then I came to Mason and I could only be hired as a term professor. And I don't know if this is something you've run into also but certainly the term faculty are looked upon as they're really just supposed to be here teaching. So I'm teaching four courses a semester, but I do, you know, I can run a lab, so I have a lab and I'm running the lab, and I have undergraduate and graduate students involved in it and everything and working on getting papers published. I still collaborate with people all over the world and do that, but they are not-- it appears they are not ever going to reward me with the salary that I wish they would reward me for those efforts. So I'm frustrated with that, I don't know, if that's been your experience as a term professor.

SPEAKER #4: Well, I'm a happy camper [laughter].

SPEAKER #2: You're...yeah.

FEMALE MODERATOR: Yes. When you talk about reward, I was going to ask you all is the reward the, you know, the publication, salary, tenure, you know what I mean? Like, or is it a

combination of all of it? What is it-- when you all said, "It's hard to get the reward." What is the reward to you?

MALE MODERATOR: Or is it even just a buy-in for continuing, you know, say I have a new project coming up, this one worked so well in past, I need more students. Are we talking about tangible, in the future, immediate? Or is it something that has to do with awarding the research at say, at a ego level so everyone knows that you're getting it accomplished. If you could elaborate on that, then we'd appreciate it.

SPEAKER #2: Well, I get rewarded from people in my field, so that's not a problem. My problem id right now with the university and the salary and juggling time constraints.

SPEAKER #1: For me it's all of it. It's salary, of course, but 50% of my time is supposed to be dedicated to research, which is what I'm doing. Students, because having nice research group, some of them don't [inaudible] the research, its publications, it's the entire thing. It's really a combination of all of them. Peers – it would be great to have other multidisciplinary groups that come to me and ask to be to on their projects, that's another thing. But to me, it's like what you mentioned, it's all of it and being on tenure track obviously, and that would be the ultimate thing and then from there [inaudible].

SPEAKER #3: I don't think there is like any spelled out kind of section in tenure evaluation – "Okay, you simply happens to successful like collaborate in multidisciplinary, interdisciplinary project, funding with a lot of students need for, or okay, you get tenure [inaudible], right?" So, there is no-- anything like written words, you know, any type of the reward system that really supports or truly rewards your efforts made for collaborative work. So even though you don't do any do collaborative work, you get the same evaluation.

GROUP: Mm-hmm.

SPEAKER #3: So then how are you going to motivate people to do that, you know? Because people can just say, "Why bother?" Because we all have "why bother," you know? Because that was exactly the thing two years ago to me, I did it by creating and I did it for students and then also too for myself because I want to learn more about what other departments do and what other disciplines do, and then is there any other way that I can expand what I do professionally. But I mean – okay, you work here at university, you're a university professor, you have basically three responsibilities: research, teaching and service. And then the degree of each of these three component sectors of your job changes over time a little bit. Pre-tenure, after tenure, you're also getting a lot more administrative like responsibilities as you go. So going through all that, at the same time, but many, many moments that before I started this kind of initiative, this disciplinary initiative, I was thinking – I mean my own department is Environmental Science and Policy, so you can tell from the name, title, the department, they're just scientists. There are people who really didn't go to school or graduate school in natural science, who are policymakers or policy people.

So then, the department in itself it is quite unique kind of structure in that unless you personally collaborate or establish some personal friends to collaborate, it's like it's diverse, but it's not

complex, meaning there's no interaction. Because the emergence of anything that emergent properties, you can only find when two entities or many more entities that interact. But if there is no interaction and then they just exist together, co-exist. It's like a community around D.C., you know? This community, that community, but not interacting because they truly not understanding the culture, whole backgrounds of each other or not making that much of the effort, or there is no facilitating process or procedure to get them to interact. Then the communities look like very diverse, but that's it. You won't get any sort of like, you know, just observable productivity of that system unless you don't, unless you able to just get all the agents in the system to interact with one another. So, even in my own department it's hard to interact, I mean, yeah. We basically do our own stuff but, and then you try to find partners or collaborative partners in other department or outside [inaudible] so much easier through your professional kind of meetings and conferences and societies and so like that. So, yeah, that's a challenging kind of thing.

MALE MODERATOR: Can I take this and steer it in a direction?

SPEAKER #3: Right.

MALE MODERATOR: You mentioned something that we wanted to touch on briefly, so now that it's fresh – you mentioned networks around the geographic area and whether you have ties because of professional organizations and what have you. What about collaborative research with other institutions, you mentioned we're talking a lot about on-campus type of thing.

SPEAKER #3: Right.

MALE MODERATOR: Is that kind of collaboration same kind of issues that you've experienced within the campus community or is it a whole other animal--?

SPEAKER #3: No, it's different. I've been collaborating with the scientists and my students back and forth with United States Geologic Survey, we have collaborative power kind of connection there over last almost 10 years. And then I collaborate – this is the first time it's going to be USGS Reston, the National Center there. So yeah, we collaborate them and then sometimes collaborate with some people at UVA in my field, or University of Maryland, other fields like that, so that's sometimes more happening than actually than it is happening here, on the campus of this particular university, right, so.

SPEAKER #2: Yes, although I see that within other organizations they can have their own issues of not being able to cross-pollinate very well, because I'm an adjunct scientist with a research institution, and I'm an adjunct faculty member with another academic institution, and while I can collaborate with certain individuals, sometimes it's hard for-- I can see within those entities, that they've had difficulty collaborating with appropriate people, a lot to be collaborating with but aren't. So I think it can work the same in other institutions. Do you know of any institutions where they all get along so well and yet they collaborate so well?

SPEAKER #3: I mean the [inaudible] people collaborate with NIH a lot, right?

SPEAKER #2: Right, yeah.

FEMALE MODERATOR: But not within the institution, right? So what I'm hearing from you all is that it is easier to collaborate, so George Mason NIH, or George Mason and West Virginia and Virginia Tech instead of different departments inside George Mason, right?

SPEAKER #3: I think so.

SPEAKER #2: Yeah.

SPEAKER #1: I don't know. Honestly I don't have any information on collaboration that I can really call, other information on even [inaudible] multidisciplinary, so my collaborators from other institutions are more in my field--

SPEAKER #3: Right, that's true, yeah.

SPEAKER #1: I work in a couple of projects that are really multidisciplinary but I'm working with people here at Mason, so I don't have any experience.

SPEAKER #4: Well you asked, your initial question for this round was, what was the thing that motivates one the most to do multidisciplinary research and I did respond to that. It would be publication, as in any research project, to come up with something that is significant enough and that you can share it with others. So without the actual publication, it's just a bunch of activities. In my opinion. Okay. And it's learning for those that are involved, preferably the graduate students, et cetera. So I think the most rewarding part – that's why the reward structure in the university is for research, as well as with teaching. But we spend a lot of time teaching, okay, and those of us who have a real bent for research, I think we're kind of forced to work and collaborate if we're going to be productive. So, facilitating that via conferences, via a grant, I think that the most significant force for multidisciplinary research is grant funding, and the requirement of having other entities involved in the grant proposal. And so I think that our major governmental funders, as well as business funders are striving to make that happen. But I think it's the input, but I think it's something that should be cultivated and continued.

SPEAKER #3: I think that's why now the provost's office is participating in a multidisciplinary proposal, you know thing, and I think that's what it's all about, is to try to kind of provide [inaudible] because we never had that [inaudible], you know? "Okay, I'm going to fund this, so you guys just team up and then come up with a great innovative ideas, right?" So, which is great, and then I know a lot of people campus probably working on it because it's deadline soon, right? But there's a lot of like mixed opinions about it. I'm very positive about the approach and that it should continue, but at the same time I say that the need for even this kind of meeting – because eventually the people who are going to team up to prepare a proposal to submit, it's going to be the people who already know each other, right?

GROUP: Mm-hmm.

SPEAKER #4: And trust each other.

SPEAKER #3: So, I think like we are now, in this room sitting together and then talking about this as a small group over coffee and the donuts and the bagels, and personally and then I think that everybody to operate, they should provide food [laughter]. Every time I go to like conferences in Europe, they all have tea times and then somehow they have a place people can gather, even very small moment in the afternoon and then somebody is going to just, "Okay, this is all the slide that I just got from the field trip to Africa somewhere," so it is, "Look at this," and then somebody, "I just came from Arctic, okay, look at this." So they have things to talk about and look at it, then sometimes it's a faculty and the faculty is there, the students is naturally there, come and go, you don't have to stay like for four hour or two hours, none of that, it's just 20 minutes of 15 minutes or sometimes brown bag and people connect. It's like embedded in the culture, but not here in the States, no. So, unless, I mean we're little different, it may different depending on the department or college or university, but I think it would be really wonderful if one makes conscious efforts to facilitate something like that. Because it starts from very small like that, just people can just gather around and then, over coffee or tea or some small munchies or something, you just open your mouth and start talking – and then that's where actually ideas can flow. But so far in my career, I haven't seen or met many people who appreciate or either really appreciate the need of that, to truly-- to do or start any interdisciplinary or multidisciplinary work.

SPEAKER #4: Relative to your network question of course, social media comes to mind. And I'm not sure if you were fishing for that or no.

MALE MODERATOR: Not really [laughter]. Run with it.

FEMALE MODERATOR: I was hoping someone would bring it up.

MALE MODERATOR: Well see, that's why we're a team.

SPEAKER: #4 Well, people self-elect into the various [?] or into communities in a virtual fashion, built around their interests and then people trying to access that set of expertise et cetera, are either allowed into the community or not, okay. So I think there's potential there, but like you, this building of trust and relationship is very much one-on-one, face-to-face, particularly I think if you're going to have these quantum leaps of people truly opening up. But I think on the surface and maybe on the intermediate level, that social media has a place to play, but when it comes to those significant breakthroughs, people are going to hold the ideas close their chest until they ultimately get published, and I think they're going to be out there. I could be very wrong, your experience might be different, but I'm speaking personally there. I would [inaudible]. It's some form of pub ed., I think I would want [inaudible].

SPEAKER #2: Oh yeah. Some people definitely don't want to share. We have a number of those. On the other hand, I haven't had much time to publish – fortunately if my collaborators are writing, I've gotten in those stuff, but I've been giving presentations [inaudible] because I want to get my ideas out there, because I think other people should run with them, you know? Because I don't have time to do anything everything, so I'm okay with that, if I don't get a publication anymore, that's first out there but--

SPEAKER #4: I'm not saying don't do it, I'm just saying that my observation of things. And I'm not speaking for myself in that regard except if I have something that I'm almost ready to publish, I don't want it--

SPEAKER #2: Right. Oh yeah. Well, I mean it's a balance. Some things, yeah, it's-- you might want to wait, on the other hand I've seen too many people publish something and then it turned out that it wasn't right. And I've seen people who won't retract things and that's, you know, it's just--

SPEAKER #4: In the scientific community, yeah.

SPEAKER #2: Yeah, my scientific community anyway, so it's--

SPEAKER #3: We have millions and billions of scientific communities in this world, yeah.

SPEAKER #2: Right [laughter].

SPEAKER: So what were you trying to get at with that networking question? You want to give us another hint?

MALE MODERATOR: Well, you're covering it. I don't have a particular aim. I'm very interested in the push and pull nature of how one would acquire information that is relative to what they're doing or if they're interested in doing it. We touched on whether or not it's a communal aspect over tea, or whether or not it's just promoting your ideas. That actual engagement that happens, are you looking and saying, "Hey, that's interesting, I want to talk to this person because I think I can help." Or is it the other way around? Someone's coming to you and saying, "I think you can help what I'm doing." Or is it all-- is there a status quo there that is maintained over some ambiguous social network.

SPEAKER #2: Well, as a long-time scientist [laughter] – as just someone put at a meeting and that's what a group of us ended in that category, so we each introduce ourselves as being "long-time scientists." But when I went to the provost multidisciplinary, meeting, okay everybody keeps saying you have to do Twitter. So, they were saying, "There you got to tweet, people talk you know, what are you thinking?" And everything, it's like, so I was trying to do that, then I realized--

SPEAKER #3: It's like, Twitter, provost, multidisciplinary.

SPEAKER #2: Well I can't get into, you know, I can't get into Twitter. I mean, I'm going to have to have a younger person show me this stuff because I--

FEMALE MODERATOR: I can show you at the end of meeting.

SPEAKER: Keep messing it up. Well, no I guess I'm in it now and I keep getting these little emails in my Google email that say, "Obama Tweeted this," or, "Somebody else Tweeted that,"

you know, "This is what's popular in your network." So I just keep erasing [laughter]. But it's distracting. And what I felt was, one of the younger grad students says to me was scrolling through Tweets, and I thought, "We're not paying attention to what's going on in this meeting if we're having to do this other stuff." And so it's this having to do stuff, that social media that is bothering me now. Because if you do that, then you don't have time to go reading the literature. I mean we're seeing more and more students that say, "I don't know [inaudible] that." I mean I had a grad student say, "Well I didn't look at anything past 2010." And I said, "You're a bad boy." I told him that. Then I said, "You have to go back in the literature." But people are coming out with ideas, that we need to – he studied the reproduction of the oyster because it hadn't been done. It had been done in the 1940s, you know? And so people are not aware of the old literature because they spend all their time on the new stuff and Tweeting and so. I have a problem with that, the social media aspect of it.

SPEAKER #3: [inaudible] Twitter account, just for that.

SPEAKER #2: Yeah, right. But I have one follower. I mean after I immediately opened it I had a follower that said Obama was a former student of mine. It was like, "How did you know that?" Anyway, I don't know.

SPEAKER #3: I haven't-- I never had trouble. I don't [inaudible] it, so it's not an issue.

SPEAKER #2: Yeah. Anyway.

SPEAKER #3: Social media, we can use net like the primary functions of it, it's in whatever we do. Yeah, it really works sometimes or sometimes it doesn't do anything for what you do, so I think you have to selectively sort of use it to facilitate something but using social media doesn't like necessarily facilitate or initiate the collaboration across the boundaries. It doesn't [inaudible] ever and then it doesn't ever get to that community level where the change is needed, so.

SPEAKER #1: What I find is useful though is ResearchGate. Are you guys using it? So I think that makes a little bit more sense than Facebook or Twitter for what we do because--

SPEAKER #3: That's professional.

SPEAKER #1: That's more professional.

SPEAKER #2: That's professional, but then I've got all these emails that say, "So and so published, one of their followers published this, this and this," and I haven't had time to go back and look at their papers.

SPEAKER #1: People from China, from India, are asking for articles.

SPEAKER #2: Articles, yeah.

MALE MODERATOR: So can you elaborate on ResearchGate, just a two-sentence blurb?

SPEAKER #1: You know Facebook?

MALE MODERATOR: Mm-hmm.

SPEAKER #1: It's exactly the same planning, but you'll have your professional page like the interview.

MALE MODERATOR: Okay.

SPEAKER #2: So you get your professional page, then you keep getting all this--

SPEAKER #1: You put your expertise there, so you get updates on what your – the people that you're following are doing, if they publish something. You can request articles so you can see them. You can also see who has seen your profile from, what institution in the world.

MALE MODERATOR: So it's very much a blend of Facebook and LinkedIn and--

SPEAKER #1: Yeah.

MALE MODERATOR: Notifications.

SPEAKER #1: You can turn messaging --

SPEAKER #2: You can get lots of notifications and, "So and so is following you, don't you want to follow them back?" [laughter] And so you have to deal with all the other emails.

SPEAKER #4: Isn't it like a personal clipping service?

SPEAKER #1: It is personal, yeah.

SPEAKER #4: Personal clipping service, things that you have an interest in?

SPEAKER #1: For research scientists, yeah.

MALE MODERATOR: Well, that sort of allows us to talk about the people that might use your research, end-users, and because of the availability of your research now to a larger audience as opposed to someone within your department or within your specific field or professional organization, have you ever had an opportunity to collaborate with the end-user? Whether or not it's an institution or an agency or the lay people that just happen to run across your research and then use whatever your research provides in an applicable way. Has that ever occurred to anyone?

SPEAKER #2: Yes, I've been invited to review federal agency documents that have used my research and participate in workshops, that we're going to help provide input to funding the agencies to provide more funds particular research and things like that. So I interact with people

at the federal and state levels, things like that.

MALE MODERATOR: Is it more discussing the findings, or seeing a way to change findings for future use?

SPEAKER #2: Well not changing findings, but maybe applying findings, or using that information to – what's the term – to establish documentation or regulations or something to use it in developing policies. For example in setting up – whether I study corals, whether particular species of coral should be on the endangered species list or something like that.

MALE MODERATOR: Anyone else? Any end-user collaboration stories?

SPEAKER #3: I mean a lot of outreach activities, or either industry, because I build with them, in collaboration with a local consulting firm, environmental firm, who specialized in the building or creating or [inaudible] stuff like that. So it involves with also municipality sometimes-- or any land owner or stuff like that. So we have a meeting usually at the end of the project and then probably saying, "What do you do?" I mean we present what other things the research they sponsored or they collaborated with, what kind of outcomes research produced, and then we share that, kind of little layered way inviting the people and the stakeholders, you know? And this is what it is and they share the information, and we conduct outreaches all the time.

SPEAKER #4: For me the projects that I've been associated with, many have been impact on things, then my role is going to do the pre and post-evaluation and then do the write-up, so those reports often have recommendations relative to what could be implemented by the funder or what would be the next step for the next phase of the research for incremental funding. I'm not sure-- I think that the biggest impact is what they've shared, which is influence and justification for policy, new policy and changes in policy. Once the research gets into the hands of policyholder or policymakers, I think that's clear that's where the ultimate impact is, but the immediate – and education. I'm trying-- I mean, I can't think of a project I've been on that, you know, they changed something – they change the world over it [laughter].

SPEAKER #3: Just like that.

SPEAKER #4: I think that the findings are favorable, therefore, okay, are they mixed findings – it would help this group of people but not...

SPEAKER #3: I'm sure it's all steps though, you know? One of those steps-- necessary steps. Pieces of that, but then that trigger can become something.

MALE MODERATOR: So I'm thinking of something, you mentioned oysters. So let's say there was research done on something that's going on in oysters – I'm not very scientific, so I'm just going to make this up I go – that the scientific community in your part gets a little of that then maybe it's large enough to get out to the mass audience, or the people that are actively engaged in oyster, watermen, whatever. They're creating, they're fishing-- the ones in the industry that are providing all the resources and the equipment to go get the oysters, the restaurants, so we're talking about the end-user, we're sort of talking about the people that would

ultimately be affected by it.

SPEAKER #2: Right.

MALE MODERATOR: As opposed to maybe not directly related because of the funding agency – of course they're policymakers, if they're funding your research.

SPEAKER #2: Yeah.

MALE MODERATOR: So I think that's a very roundabout way to think about what we're talking about when we think of end-user. Maybe outside of the network of those that are within the project itself.

SPEAKER #4: Well, to that degree then, if you want to take out all the intermediaries, in like STEM research, which I was into STEM before STEM was in, okay? But--

MALE MODERATOR: That's a good quote.

SPEAKER #4: Yeah, it is. The science and engineering festival downtown is where I'm from, you know, a handful of folks over the period of five to six years to impacting a quarter million people, okay? With hands-on, and 3,000 different people participate.

MALE MODERATOR: Mm-hmm.

SPEAKER #4: So it's become huge, and so that is directly impacting a lot of young folks and it's grown significantly. This school has a major university. Every university now has some kind of STEM activity across disciplines – not just in engineering, but also in education, and in other areas. So I think it is impacting end-users, and there are businesses that have popped up. I mean, you drive down 123 on your right, if you want to save your child or a special STEM experiences, private industry is involved in that. So I think that's an example of multidisciplinary policy changes and changes in the attitudes of folks from, "Oh, it's geeky," to, "Yeah, this is really of high impact and really important."

FEMALE MODERATOR: Geek chic now.

SPEAKER #4: Geek chic [laughter].

FEMALE MODERATOR: So let's transition a little bit. We talked a lot about what are the challenges for multidisciplinary research. I heard a lot, talking about, the reward the system, not having enough time, the languages – there isn't a language, English or Portuguese or Spanish or Chinese or whatever – and languages between different disciplines, right? So my question is, if there was an organization that wanted to help you to make this connection, so now you're not on your own anymore, so now there's an organization that want to help you with that, how would you feel about that and what would you expect it? What would you wanted from them? It's a broad question. I haven't-- it's a lot of other probes, but is that something that you think would be helpful?

SPEAKER #3: Of course. I mean if there is organization who can help, then yeah.

SPEAKER #2: Yeah. But then again, that might take up more of our time to have to field things coming in from such an organization and just making decisions about whether to work with somebody or not.

SPEAKER #3: So taking more of your time rather than helping you [laughter].

SPEAKER #2: Yeah. That's my reservation [laughter], because I don't need anybody. I get lots of people that are asking me, grad students that are asking me for work [laughter].

MALE MODERATOR: So you're saying one of the benefits of making the personal relationships when they do collaboration is the fact that you know them, and then you're already onboard.

SPEAKER #2 and #3: Right, yeah.

MALE MODERATOR: So widening the potential pool of people that will be interested in collaborating with you, what you're saying, it might be more of a burden time-wise than it would be beneficial to see that potential?

SPEAKER #2: Right. Yeah, I can see where maybe younger scientists might appreciate having such a thing.

SPEAKER #4: Well doesn't it already exist? Doesn't that service already exist? With all the – in many universities now, now I'm not sure that Mason actually does, but they have all the grants that are out there or you can subscribe to a service or the library does. You can – based on keywords, you can come up with – now I guess what you're adding too and is multidisciplinary, so the new thing would be, it would only be focused on multidisciplinary? Is that where you're headed with your question?

SPEAKER #3: What is the title of the center? [laughter]

MALE MODERATOR: Well, I guess we're sort of asking, "What would you want?" I mean let's call it a-- you mentioned that website, let's call it something like that that's a repository of information that would allow you to be able to make the connections that you would want to make – whether or not that is a personal connection or just information. Would it be something that you would want to go to and if so, what would you want from it? Would it be something like you said, notifications that get sent based off of keyword searching? Or would it be emails to already overloaded email inbox, or would it be phone calls, or would it be providing a formal conference-style engagement?

SPEAKER #2: Well, I think students who are getting their doctorate and want to continue doing research, there are already resources that they can find post-docs. You know, certainly they're searching on the Internet or networking at meetings. I encourage my grad students to go to

meetings to meet other scientists and make those connections, and just keep asking around kind of things. Because yes, you can go look for grants and things, but then you also often find that they don't want to fund what you're interested in working on.

SPEAKER #4: Right.

SPEAKER #2: So it can take a lot of-- so I don't know, I think with the search engines these days, then people could find information on their own when they need to, maybe. So I mean that's my take on it.

SPEAKER #1: The only thing I'm thinking of is-- let's say that you already have a team, you already have a project but you need an expert in a specific field, and you don't know anybody, so that could be something I would be interested in.

FEMALE MODERATOR: Okay. So is that something that you think this institution would, you know, how would you do that? So let's say if you had the power to tell the institution that I want you to do this, this and that, what would you suggest?

SPEAKER #1: I think the idea would be to give you the name of the project, the exact person I would need, the amount of time and the person should put into a project, then the length of the project. And I would think that it's just a search that you will need to do on the Internet, I don't know, epidemiologist [laughter], malaria expert.

SPEAKER #2: Right.

SPEAKER #1: It's not something too complicated but if you have experts giving you their availability, so I'd say that, I am an expert in remote [inaudible] engineering, and I'm telling you I am available for a certain amount of my time for the next two years, and somebody comes to you asking for this expertise, then you can relate that to me.

SPEAKER #2: That's pretty cool.

SPEAKER #1: Yeah.

SPEAKER #2: But then you would need to interview them, and we really if this person you're going to be able to work with as with anything, because--

SPEAKER #4: Well then they'd have to apply. It would be like a research Monster.com [laughter].

SPEAKER #2: Well, yeah. That's a possibility.

FEMALE MODERATOR: But is that something that would work to you all? Do you think? Would it be helpful?

SPEAKER #1: I don't know.

SPEAKER #2: Yeah.

SPEAKER #1: Hard to tell.

SPEAKER #3: Hard to tell. I understand Esther's concern, I kind of recognize, yeah. It's just another center or institution saying that, "We're so organized to help you." But then, right, we already have expert assistance on the field, is probably every field we participated in. And then you can easily pull somebody, because you already know somebody or – it's even not a six degrees of separation. We know somebody who knows somebody so we can, usually that's how you find your collaborators and if you need some networks together instead of just meeting a stranger. It doesn't happen that way in the real world. So I don't know, this whole world now revolving around BME services, or [inaudible] services, electronic services. You don't go in a traditional way, you know, into someone's service center or shop anymore and then you can do anything electronically, so I think it's possible if we-- I mean, some kind of database that will work really well, accommodating all the disciplines, and all the departments around the campus. But like I don't see really the need for another institution or institute or center for just for it, yeah.

SPEAKER #4: Mm-hmm.

SPEAKER #3: Because then you have to still interview those people and those people has to interview you too, even get to learn about your needs, that in itself is so much time spent on you. So people just like Esther's concern, I think that people will relate to that, "Well, I'm fine, I can find people online or through my previous collaborators," or something like that personally. But it will depend on what types of collaborator you are looking for, you want to find. Because for example, like I had local high school students come over to the project that my students were doing. So I personally did all that because I have one of the science director in the TJ – Thomas Jefferson High, because she knew me and then she borrowed some of my lab equipment to dry some soil samples collected by her students. So we had some kind of like, we were acquaintances over the years, a few years, and then I invited her students one year to be a guest for my student's presentation. So it's kind of K-12, you know, involved with kind of STEM.

SPEAKER #4: That's great. Really super.

SPEAKER #3: Yeah, so we did that a couple of times and even in May, all the high school students came to Mason Pond when my students were presenting the posters around the pond about the floating wetlands project. So I think we did that, but I personally just call and then-- her name is Lisa, so, "Lisa, when are you coming?" And then, "Your school bus can be mobilized?" Or, "Have you got the permission from your principal?" And then, "How many people coming?" And then, "We're coming in very small car, and the students have the AP exam coming." So all this kind of thing. So I arrange it all – it is a lot of time on me, right, absolutely. So I did that as a showcasing because it can be really nice of outreach and then K-12, which will be – who will be here, you know, college in a couple of years, so they're kind of seeing what when they enter college what they can do or what they can expect. So also the undergraduate students can actually talk to them who do not know anything about what they

have done. So it's really challenging for them to explain their research to this outside guests other than to their own peers who already know everything about this, what they did. So if there is a service on the campus that can facilitate that kind of communication or arrangement, with a clear goal of like a STEM initiative--

SPEAKER #4: Exactly.

SPEAKER #3: Something like, maybe that some faculty members might be, find it useful and then "Okay, I'm going to use, take the service." So you design whole course or activities from the beginning of the semester, and then having third party to do some kind of facilitation arrangement, connectivity is there to pull it all together.

SPEAKER #4: I think that's a great idea because event management is a field unto itself. So to be able to walk in and say to the event manager, "who, what, when, where, why and how," and then the administration of that is more a managerial role rather than administrative "do" role by each department would be, I think, a breakthrough. You know, if that's what the university wants to do.

SPEAKER #3: So I already told my students, "I cannot do this anymore. I'm not going to do this, every year, or maybe even every other year." Because it involves a lot of arrangement, that kind of stuff like a lot of time talking to different people, different sectors."

SPEAKER #2: Each organization does that on their own at this point. That might be very helpful to have someone to make those arrangements for those of us who want to do that kind of connection with the community because otherwise, yeah, it can take a lot of time.

SPEAKER #3: Yeah, they'll get to the campus, then, "Oh, where's the park?" And then so, I have to run to them with a parking, you know, permit--

SPEAKER #2: Yeah. Kind of like the Center for Global Education facilitates courses being presented in foreign countries and stuff. So that my PhD student have been running the course during winter break for several years, but the students have to go through that entity to get everything arranged and stuff, so she's not that involved with that part. She can do more of the teaching part, so that might be very helpful to do.

SPEAKER #4: So, I'm trying to understand given your background, okay, what might be a concept or a formative idea that we can feed into because, lifting our arm without any idea as to whether it's a private type thing or a university type thing. And it's great to have users involved on a formative basis and not biased. I think it would be helpful to know from a new product development perspective, as to where this gadget or thing might come from. Would it be governmental type thing? Would it be like a university type thing? Would it be like a private entity type thing? If everyone knew that and then we could help you maybe a little better.

MALE MODERATOR: [inaudible].

FEMALE MODERATOR: You know where [inaudible].

MALE MODERATOR: So Virginia Sea Grant is a funding agency that works for – you know, you've all heard of land grant universities, I mean I would assume that you guys have heard of sea grant universities. George Mason is one of them. Each state that it's along the coast or the Great Lakes has a Sea Grant program. So Virginia Sea Grant itself is looking for ways to improve how they can be a – and this is my term – what I'm calling as an information broker, between the people that are doing the water work, coastal, fisheries, wetlands, ecology stuff, what have you, and even related to that and the university faculty members at the partner institutions, affiliated institutions, and so we're finding that it's--

FEMALE MODERATOR: Giving back to the community here.

MALE MODERATOR: Yes and back to the end-users, so back to the community of people that benefit from that research itself. So it's a moving target that they're interested in seeing what ways they could position themselves to better effectively communicate what they're doing and what the benefits of whatever research is going on could, to all the different communities and partners involved, if that makes sense.

SPEAKER #4: Makes a lot of sense.

MALE MODERATOR: And so, you know, that's why I brought up the oyster idea and so there's a lot of stuff going on, but maybe other people should know about as well, maybe they have a competing or even supporting research.

SPEAKER #2: So because its funding came from Virginia Sea Grant, are they only interested in things that would be applicable to the marine [?] resources in Virginia? Or other science?

MALE MODERATOR: What they're interested in, and anything that we could uncover that we would be interested are mutually exclusive I think. But I would say that the intent of this is, is for the original point, which is you're at the marine and water types of environments.

SPEAKER #2: Mm-hmm.

MALE MODERATOR: But for our own research interest, we're getting in beyond that and if that situation would occur, to look into more different ways in which people could promote or acquire information across science-related fields so it gets back to that communication and so--

FEMALE MODERATOR: And form relationships too.

SPEAKER #2: Mm-hmm.

FEMALE MODERATOR: A lot of things that I heard from you all today is about not only you know, connecting with this other people from different fields, but you know there's always a trust, right? I'm not going to work with someone if I don't know you, and I heard about, "Oh, I'm going to have to waste my time until I know that you're serious." So it's all-- there is a lot of interpersonal interactions on this whole process of becoming multidisciplinary.

MALE MODERATOR: And so part of the reason why we didn't mention all the stuff up front was to see if there's stuff that came to the surface that was shared among the whatever participants, to see whether or not there is a glaring hole that we could observe through one focus group or then or however many that we choose to do, without clouding it with the content and the purpose of the institution that's interested in finding us out.

SPEAKER #4: I think it's a worthy goal, and I think that from a communication perspective, I haven't looked at their website, but I think that fundamental would be their website and directing people to that website. I don't know what additional resources that they have within their organization, but if they have specialists within the organization – and many do – then to build the community around those specials. And once it becomes – and they probably already have this – a central point of contact for that specialty area, and the network grows. So you have not only an advocate within the organization but we have word of mouths going on across an institution, so we're aligned with them. Then the next thing that I think that would be a value from a research perspective is an outbound time activity that would cause people to go to the website frequently every time there's a change, so some of the basic models that the museums now tell you to bring traffic to their website, I think would be a high value. And the focus of all this, I think would be research initiative by subject matter experts or areas. The ease at which people architecturally can access without a whole bunch of clicks, okay – and I don't mean that pun intended [laughter].

FEMALE MODERATOR: She's good at sound bites. You'd be great on Twitter, like this little sound bites. Do you all – did, I mean, have you looked at the Virginia Sea Grant website at all?

SPEAKER #4: I know we should have. I was supposed to do that before I came.

SPEAKER #2: You didn't mention it, but I did it at some point, I think.

SPEAKER #3: They have to sign up something, right, Virginia Sea Grant? In our website?

SPEAKER #2: Are we linked into it?

SPEAKER #3: I think so.

SPEAKER #2: Yeah, maybe we are, because we are – Mason is now a member, Virginia Sea Grant, and primarily the faculty involved are from our department. So, you know, I thought they were doing pretty well [laughter] so the expertise in Virginia Sea Grant, those particular faculty members who might be participating in Virginia Sea Grant-funded projects or, you know, relating to, you know, having an interest in what we're doing. I mean, and they do have staff, and they have lots of funded projects for different places, so.

SPEAKER #4: Is it all state funding or is there federal funding coming in also?

MALE MODERATOR: It's federal.

FEMALE MODERATOR: It's federal.

SPEAKER #2: It's federal. Yeah.

FEMALE MODERATOR: Through NOAA.

SPEAKER #2: Through NOAA, right.

MALE MODERATOR: And so, you know, as you said, they have a lot of projects and there's a lot of people that are affiliated with them, but that window is narrow, whereas some of their research could be applied to people across disciplinary boundaries as well – as opposed to the one or two people that are doing mainly some very specific research. So that's sort of like a behind the scenes look at what we're trying to see if we're talking about brand awareness, you're talking about traffic, we're talking about number of visitors on our website, those kind of things. But we're also getting behind who would be interested in looking at what potential funding opportunities are available as to – with Virginia Sea Grant as a source.

SPEAKER #3: That can lead to actually a change in their scope of the sort of project through funding?

MALE MODERATOR: Well, stuff along those lines.

SPEAKER #3: Yeah.

MALE MODERATOR: But we're at the very beginning phase of this.

SPEAKER #3: They're very limited, in my understanding, in the scope of the particular research topics or project that are funding.

SPEAKER #4: Yes. But they could--

SPEAKER #3: That's why not many people are applying because--

SPEAKER #4: Right. But if I do that really well, if they do that really well and I communicate it really well. We are like much like the Discovery Channel, and so with the low cost of a YouTube kind video and our communication tools, to be able to expand and make it available. A video is so powerful. Every college and university now is for recruitment is adding a video to the website, a small – so the same with their website that would, ultimately when people Google those keywords, will take them directly to their site and I think video enhance whatever they're funding more.

SPEAKER #3: Mm-hmm.

SPEAKER #4: You should be-- I mean, the people who are doing--

SPEAKER #2: Well I know that our department has video initiative going on [laughter].

SPEAKER #3: Basically the entire College of Science.

SPEAKER #2: Yes. So--

SPEAKER #4: You do?

SPEAKER #3: No, it's not really an initiative. It's just, you know, it's like a trickling down from the top basically. "Okay, we have to promote more, promote more."

SPEAKER #2: Yeah.

SPEAKER #3: So just, you know, like a month ago, right?

SPEAKER #2: Yeah.

SPEAKER #3: Months ago people were all worked up, and then, "Oh, we should start Tweeting, we should start Instagram." And then, "What is Instagram?"

SPEAKER #2: Yes.

SPEAKER #3: So that's what's happening...

SPEAKER #4: I knew what Instagram was, I haven't done it yet, but [laughter]. Yes, and we've got a grad student who's experienced in videography so she's going to be coaching my grad students when we do field work this summer, to get our funding. So that kind of thing so we can put a video up in the department webpage and hopefully have more students interested in that, so yeah, so definitely into the marketing thing people were doing, so.

SPEAKER #3: I didn't really have anything to do with what you are surveying or investigating, but since I have to leave soon, I don't know if it's really relating but I want to say, one thing I want to ask you, or inquire information about. The communication between departments, different departments or all that, I think it should start like at the very undergraduate level. I think graduate level doing it – because depending on your project, you are already the disciplinary, you're collaborating just to do your PhD and Masters sometimes you crossover in meeting – going to different organization, you already have that kind of experience to some degree. But at the undergraduate level somehow I think of-- even more so these days, have become much more compartmentalized, so they just come in and take the courses in their own and then – yeah, we have the New Century College now change the name, but then there's no mechanism really, substantial mechanism that would facilitate or benefit or give more points for students like making more efforts to go over then take another classes and creating their own programs, interdisciplinary programs for their entire college experiences. So I think communication-- actually communication needed in any major, a certain amount of training in communication. I think it's absolutely necessary and then it will facilitate the entire learning experiences, no matter what you're majoring in. So that has to be pitched in, and then really we have to have some kind of solid program that are not listed only in communication department,

but they can be cross listed almost the entire departments that if you ever take this one credit or some credits, to be able to communicate what you do or what you learn with the people outside your own field. So, I think that can be a really sort of like a nice thing to be added into the college curricular and then also eventually facilitating or training students in the field of interdisciplinary or multidisciplinary, they get exposed as early as possible I think probably they would be better than we are, communicating one another, so.

FEMALE MODERATOR: I meant to ask that question and I didn't so...

MALE MODERATOR: Go.

FEMALE MODERATOR: Okay, so I didn't disclose this when I introduced myself, but I fell in love with science communication because I ran a science café in Morgantown, West Virginia for two years, and I became completely passionate about it. And I understand all you're saying all the time, you know, I've organized everything from advertising to finding speakers to trimming the lecture to be jargon-free and all of it, and everything you're telling me right now, I have this feeling that one way that we could increase multidisciplinary research and get students being better at communicating would be if maybe, I don't know, if Virginia Sea Grant would fund or if the university would, you know, allocate money for it, but if we created a science café here where undergraduate students --

SPEAKER #4: What is a science café?

FEMALE MODERATOR: Science café, it's basically a way where you get researchers or grad students who get together usually in a restaurant or in a club and you talk about their research, jargon-free, it's usually a 15 minute, 20 minute max talk and in a very lay language and easy to understand--

SPEAKER #3: We have that here.

SPEAKER #2: Mm-hmm.

FEMALE MODERATOR: We had--

SPEAKER #3: The science--

SPEAKER #2: The science slam?

SPEAKER #3: Yeah.

SPEAKER #2: Science slam.

FEMALE MODERATOR: Yeah, you have one --

SPEAKER #3: Right, slam, yeah.

SPEAKER #4: Slam? S-L-A-M?

SPEAKER #3: Slam. Yeah.

FEMALE MODERATOR: Yeah. I saw that happening last semester and--

SPEAKER #3: Right. One of our department, there was two pools, students won [inaudible].

SPEAKER #2: Yeah.

SPEAKER #3: Right, you're right.

FEMALE MODERATOR: Do you think a more-- because I know that that happened last semester but, you know, when I heard about it, I think it had happened already. So do you think that some way of organizing more those or aiming--?

SPEAKER #3: Yes.

SPEAKER #2: Of course that was a contest.

SPEAKER #3: It was sort of like contest. You have to talk about your research in 15 minutes or 5 minutes or something in a very lay way.

SPEAKER #2: Five minutes.

SPEAKER #3: Pitch it out and then leave, that's it.

FEMALE MODERATOR: Yeah.

MALE MODERATOR: Yeah.

SPEAKER #2: And – but, you know, so that's kind of -- that can be difficult for people to get up and do that.

SPEAKER #3: But they can be a piece of the science café that she's talking about.

SPEAKER #2: But maybe that can be – yeah, a piece of that.

SPEAKER #3: Yeah.

SPEAKER #2: And I don't think we should have this competitiveness going on all the time. It'd be good just for people to get together and chat.

FEMALE MODERATOR: You can do it as a challenge. I ran one, it was a "science idol" over there and that's what, you know, there was a winner and there was a – but we used to do just regular presentations so it was grad students. And one thing that I noticed there is that there was

people from different departments started talking, so I'm just bringing this up because the whole time we're talking I kept thinking about this thing that I did and so, I had to ask, like is that something you think would be valuable?

SPEAKER #3: Yeah. The students would like it, yeah.

SPEAKER #1: I think this would increase the brand of culture on campus, which I think is totally missing here at Mason for many reasons, you know, we have lot of part-time students. But the students who spend time here, they don't get together. There is nothing that can connect them.

SPEAKER #3: Hundred percent, yes. Yeah [laughter].

SPEAKER #1: And the other thing would be interesting to have the end-users get involved as well.

SPEAKER #4: True.

SPEAKER #1: Because we never talk to them.

SPEAKER #3: Eventually even sponsors, some of them would like--

SPEAKER #1: Even sponsors--

SPEAKER #3: Yeah. There's a lack of culture which is completely true, to this university becoming like a [inaudible] over time very soon. We need the culture to grow together, yeah, which is not just physical. Like buildings.

FEMALE MODERATOR: Sorry I had to ask.

MALE MODERATOR: No, I like it. Building community and establishing better relationships, I mean it's not limited to just science. Anyone that has a specialty training to discuss that specialty, someone that doesn't know anything about it, that's ubiquitous.

SPEAKER #2: Which is good training for dealing future endeavors. Of course.

SPEAKER #1: And the other thing is we'll have fun.

SPEAKER #2: Mm-hmm.

SPEAKER #3: Absolutely.

SPEAKER #1: You need to have fun.

SPEAKER #3: Right, absolutely.

SPEAKER #1: And this is part of it. You know, this is our job, and for grad students this is our daily lives.

SPEAKER #3: Serving drinks out of test tubes [laughter].

FEMALE MODERATOR: Okay, well--

MALE MODERATOR: Well, we're aware of time.

FEMALE MODERATOR: Yeah, it's been an hour and a half.

MALE MODERATOR: Does anyone want to add anything else on top of what we've just discussed?

SPEAKER #4: Yeah, after I look at the webpage, and now that I know who you've headed, is it okay if we get post-focus group ideas?

MALE MODERATOR: Yes.

FEMALE MODERATOR: Yes, I was actually going to ask that. Now that we are all aware of the institution, if you-- and it's like homework, but not necessarily homework. If you have a chance, if you come on across the website, those of you saying too many clicks, right? You don't want to get too many clicks to find things so if you could give us feedback on how the website is set-up, ideas for them to improve or maybe, you know, you go home and in the middle of the night you have a fantastic dream about, "Whoa, that's what they should be doing," if you could email us.

SPEAKER #1: If we have time for--

MALE MODERATOR: Yeah, absolutely, we really appreciate it.

FEMALE MODERATOR: I might be contacting all of you again about the science café --

SPEAKER #3: Please, yeah. Would you send me an email? I never got email from you, right?

FEMALE MODERATOR: No, he was the one doing. I'll send you an email.

SPEAKER #3: Right, you should send me --

MALE MODERATOR: I have to follow-up, you know, s--

FEMALE MODERATOR: Yeah.

MALE MODERATOR: Hey Doug, you can hit recording now, man.

//END

Appendix 3
Focus Group Interview: July 21, 2015

GMU Misc 21 JUL 15

FEMALE MODERATOR: Okay. So just so we can get the consent on record, do you all agree to participate in this focus group and with all that has been disclosed to you so far?

SPEAKER #1: Yes.

SPEAKER #2: Yes.

SPEAKER #3: Yes.

SPEAKER #4: Yes.

SPEAKER #5: Hello.

MALE MODERATOR: Oh. We have a new arrival. Hello.

SPEAKER #5: Hello.

FEMALE MODERATOR: Hello. Good morning.

SPEAKER #5: Good morning. This is Sandeep from Old Dominion University.

MALE MODERATOR: Well, we were just doing introductions so if there's anything else that you would like to add to-- other than your name and institution. Maybe your research interests or something similar.

SPEAKER #5: Yes. I have been at Old Dominion University the last five years. I started in 2010 and I'm in civil and environmental engineering and my background is chemical engineering. I did my Ph.D. from Albany University Alabama. And I worked mostly on the biofields area so [inaudible] biomass. That's what my background is. For my teaching I teach mostly the alternative energy elective courses, carbon clean resources, biofields engineering. This is what I do. I'm from India and I came to the United States in 2007.

FEMALE MODERATOR: Okay. So I'm going to start, and if it looks like I'm reading it's because I have a cheating sheet here. So basically what we want to do today on the broad scale is talk about collaboration and research, and we don't want to define that or what that means for you, but we hope that you can be honest on your opinion about research practices and any collaborative effort that you have done in the past, present or future. More specifically --

MALE MODERATOR: Hold on one second.

FEMALE MODERATOR: Can you all hear me?

MULTIPLE SPEAKERS: Yes.

FEMALE MODERATOR: Okay. So more specifically we're looking for ways that collaborative research can be improved. So we'll ask you to share your experiences and help uncover the pitfalls and challenges that, you know, fall into trying to have multiple disciplinary collaborations. So our questions have been developed to allow free-flowing conversation among you so feel free to express your opinions and feelings and what you like and what you hate about it. So we hope that this will be about one and a half to two hours conversation, but, you know, it's going to last as long as you have things to share.

MALE MODERATOR: And feel free to jump off the call if for any reason whatsoever. We're just happy that you're participating in some capacity.

FEMALE MODERATOR: Do you want to--

MALE MODERATOR: Yeah. So you've got a general idea. We've been kind of vague about it, but we're talking about multidisciplinary collaboration, and so the easiest way to start a conversation like this is to talk about the challenges or the problems that you've experienced in your professional history and your past. And so are there any specific collages that you would like to discuss when you're talking about making connections that would lead to collaborative efforts? And it might – if it's easier to do a round robin, I don't -- I'm not really -- if there's a specific order, if you guys have, you know, stage fright or virtual stage fright or if you don't want to speak over each other, that's fine. I'm not the most polite individual ever, so if I'm talking over you, I will apologize for it because I'm sure it will happen.

SPEAKER #2: Well, there are three things that come to mind. One is institutional priorities. So whether multidisciplinary collaboration is rewarding. The other I think would be shared language. Sometimes people in different-- with different disciplinary backgrounds have incredibly similar goals and interests and yet, without a shared language it can be difficult to communicate. And then finally, something that I think is important in many academic contexts. There are issues of, I think, overconfidence sometimes or lack of humility about exactly the strengths of what other people do and their expertise. So again, for me, the three things that immediately come to mind are institutional priorities, shared language, and sort of overconfidence about one's own abilities to communicate in other areas.

FEMALE MODERATOR: Can I ask you to just – and this is because I have English as a second language – when you say shared language, what do you necessarily mean by that? The language in your field or real language? You know, like, different--

SPEAKER #2: I mean, I think lingo and jargon associated with a specific field. All of us, you know, were trained a certain way in terms of our day-to-day interactions with both colleagues and students. We use a very specific type of language and often I think people in different-- with different training and different disciplinary backgrounds really do have very similar interests and priorities and yet when they attempt to talk about those issues they're using different lingo and different jargon which can make those communications challenging.

SPEAKER #4: I'll agree on that one. We spend a lot of time trying to come up with some common languages so that we can talk among ourselves and it's primarily the jargon that the different researchers are used to.

SPEAKER #5: Yes, I --

SPEAKER #6: If I may, I can sort of just add to that. One of the experiences that we have had is we work with a lot of clinicians – and clinicians are not researchers, so they have not only just a different lingo, but they have a completely different approach. And sometimes when you work with folks who are clinicians and not researchers and you're trying to do research, it can be quite frustrating because their approach to a problem can be completely different than the way a researcher might approach the problem.

SPEAKER #5: Yes, I kind of agree with the language issue. Common jargon and all of those things. Now, one more thing lacks in the platform for which multidisciplinary can work. It's left on the individual objectives and suppose I want to go for a proposal, I have to approach someone and then both have different objectives and departmental support, how much support for the-- across the boundary proposals. Those things come up a lot. And if there is a platform from which, more like a cluster or something like that, then that kind of simplifies a bit. But that has been one issue. Who gets the credit and how it goes.

SPEAKER #1: Yeah. I'll toss in there. Someone who has just [?] tenure boot became acutely aware of how easy it is to start some of these collaborations that don't actually lead anywhere. You know, I've been involved in a number of projects that had a lot of multidisciplinary spin to them and they kind of fizzled out. And so I've kind of become a little bit more gun shy about becoming involved in projects that I'm not pretty sure that I can sort of personally take the lead on and make sure something comes of them because not everybody has the same-- you know, going with the rewards system. That sort of thing. It costs different researchers different things to have an interdisciplinary project not work out.

SPEAKER #4: I'll add one that I think is kind of related. There's got to be a certain amount of trust among the researchers and it's hard, especially when you're first getting started, for that to be there. But the successful ones for me that have worked out pretty well, I trust those people completely that they are experts in their field and they're going to deliver what they promise. I've done a couple interdisciplinary ones where basically people did not deliver what they promised and it's not an area that I could – no matter how much time I wanted to put in – kind of correct for that. So over time, there's got to be a level of trust that develops between the collaborators.

MALE MODERATOR: Okay. I've got a follow up question on the topic of trust. Is this trust something that can be acquired passively, or does it have to be firsthand because of previous interactions or dialogue or an acknowledgment of their existing work or can this be through connections with other individuals or other entities?

SPEAKER #4: For me--

SPEAKER #6: I mean, I can comment on that. And I would just say that I think if somebody that I trust trusts somebody, then that means something to me. If I don't know somebody at all, and I don't know anybody that I trust who knows that person, then it would depend on the interaction that I have. And I would say that if I was collaborating with somebody and they didn't deliver within reason on what they promised, I would probably never collaborate with them again.

SPEAKER #4: I agree. A lot of the ones that I work with, I don't get to necessarily choose my collaborator. They're part of a government project or something, so they're assigned. So I don't know them beforehand. In some cases I know them third-hand and the feedback I get from their co-workers can help, but primarily it's just day-to-day, are they delivering what they said? And I'm sure they're asking the same thing of me.

SPEAKER #2: I agree with all of those points. I will add that in the few cases where there are preexisting relationships, that is extremely helpful.

FEMALE MODERATOR: Okay.

MALE MODERATOR: It seems like we've talked a lot about institutional objectives and reward systems and trust and emotions, but we haven't really discussed how much time is required to get on board with collaboration. Is that something that you think about first, or is that just sort of icing on the cake? And say, "Okay, if this can get done in a good order, a fast order," or is this something that we're going to say, "Okay, this takes up too much of my time. It doesn't matter if there's a reward at the end of it. It doesn't matter if there's a large trust between the collaborators." I guess my question is, how much does time play a role in your decisions when you decide to collaborate or not?

SPEAKER #1: For me, it doesn't play enough of a role. I've definitely gotten myself into some binds with overcommitting. I think that has something to being relatively new to this game. But you know, I will say I've been surprised that it's easy enough to draft a project. You know, if you turn a proposal in to somebody and you get some support for it, you can kind of stovepipe your time commitment in that proposal, but I have yet to work on anything where it really felt like my time commitment didn't kind of wildly go beyond what I had imagined or intended to commit to, and I think that maybe goes hand in hand with academics to some degree. So the answer is no, I haven't really used time so much as a gauge.

SPEAKER #5: Yeah. Same here. Since I don't prioritize the time, is it going to take extra time so I do not go for more to discipline. That's not the issue. Typically, based on the watch kind of being developed, what kind of collaboration we are going to do and how much is the contribution. But time – I have not thought like that yet, but it might be.

SPEAKER #4: For me, if it is truly interdisciplinary I do think there's a big time investment I've got to plan for. And if the reward or the interest isn't there in the long run, you know, that's a cost that gets charged against the project and me so I do consider it.

SPEAKER #2: Yeah, I would agree very strongly, which is pretty much in every professional decision that I make except those that involve service like this. I compare the benefits and costs of what I'm doing and the benefit is a professional research upside, and my most constrained resource at the moment is time. So I think very carefully about the amount of time it's going to take.

SPEAKER #4: And I definitely think that interdisciplinary projects take more time for the same rewards than a single DI kind of project. Or even projects within my normal research hallway.

SPEAKER #3: Yeah. I would agree that time is really important. Time commitment is also related to the institutional objectives, and I think if you work in a department, for example, that doesn't fully appreciate the time commitments that are required to have good collaboration, that can be a really significant problem. You know, one problem that we have is we have a lot of patients on a day-to-day basis and obviously, if you're caring for patients, that has to take priority over anything else that you do. If you're not careful about the time commitment, that can be a real problem especially if you're working with patient care responsibilities.

MALE MODERATOR: One final question on this idea. We've mentioned it briefly, but we haven't addressed it directly, is the communication methods, or how the time is-- is it all isolated work and then you send out e-mails, meetings, conference calls? Is it virtual conferences? Is it telephones? Is it professional monthly or quarterly meetings? Like, where would these collaborative efforts be discussed and how frequent, I suppose, would you have to spend your time discussing them? Or is it more traditional academic work where you go in your cave, you do your work and then you send it around?

SPEAKER #6: Well, I could just add that, for me, despite all the technology that we have, anybody I collaborate with, if possible I really like to be able to have met them somewhere – at a conference, a professional conference, and feel as though I actually have some personal connection with the person. Certainly if you're going to collaborate with people, it's always good if you actually can work with the people that you're collaborating with. So I think for me anyway, a lot of times collaborations can be borne out of attending professional meetings and meeting people and sharing common interests. And I think, at least for me, that's where a lot of times it will start. You know, I think for me anyway, I rarely e-mail somebody I've never met and say, "Hey, would you like to collaborate on blah, blah, blah," you know?

SPEAKER #4: For my projects, we will have frequently weekly phone calls that are conference calls. We try and get together twice a year as a group. So that's travel involved. We're, because a lot of government employees can't do Skype and have limited video conferencing, it's just a conference call. But they are every week for at least an hour, and that's fairly common for the bigger interdisciplinary projects for me.

SPEAKER #3: I would say to somebody just starting out that I would be more willing to collaborate with somebody in my field remotely and if I was going to do something interdisciplinary, I would definitely try to do something where it was somebody close by where we could meet on a regular basis. Because if it's something new that I was getting into, I would want to, you know, talk with them face-to-face on a pretty regular basis. So I think doing a

remote interdisciplinary project as somebody just starting out I think is something that I probably would not get myself into, just in terms of time.

FEMALE MODERATOR: And building up the trust that we were all talking about, too, right?

SPEAKER #3: Correct.

FEMALE MODERATOR: So do you think that—

SPEAKER #5: Yeah, that's true.

SPEAKER #3: Yeah.

FEMALE MODERATOR: Okay.

SPEAKER #6: You know, I don't know, I would throw this out there. I'm curious what other people's experiences have been. But I find it also different when you have conference calls with your project officers at the funding agency. And if you're having a conference call with multiple collaborators with a project officer, I also find that to kind of be a unique, interesting different experience because the implication is further down the road you're going to want more funding – and everybody is going to want more funding. So that's another reason to work with people that you can trust. I don't know if other people have had those similar kinds of experiences where everybody is kind of vying for more funding down the road, if anybody else has had those kinds of experiences.

SPEAKER #4: I've had two kinds of project managers – one where we're very concerned about funding and we need to make sure the project looks good no matter what, and those kinds of conference calls run differently. I've had other project managers that are really part of the process, that they're going to do the policy side of it. They're almost like another researcher as part of it, and they're much more open and honest. If there's a problem, we'll just bring it up. But when it's the person deciding funding solely? Yeah, we're more careful.

MALE MODERATOR: Well, if anyone has any other comments on the kind of the thread that we've been pulling for the last 15 minutes or so, now is the time. If not, we're going to change gears just a little bit and try to get a little more in depth into the hopping over the fence type of collaboration. I think-- so, okay. So I'm thinking about this and I want to say it the best way I can. We've been talking about multidisciplinary collaboration with the assumption being that it seems like it is within field and without field. But I want to talk a little bit about researchers at other institutions. We have four institutions on the phone call today, and so it seems natural that this type of collaboration would occur across institutions, but I would just like your opinions, thoughts, on how those kind of connections can be made. If that is an understood part of it, does it determine more upon the discipline as opposed to the institution, so on and so forth.

SPEAKER #2: I will say that I do 90 percent of my work with colleagues at other universities, and the way those connections were made are just through the day-to-day course of professional life – conferences, graduate school connections, mutual acquaintances. Yeah. But that's a huge

part of what I do and I expect that to continue.

FEMALE MODERATOR: Are they are from Virginia or--?

SPEAKER #2: No, they're all over the world. My most frequent collaborator is in California, and my second most frequent collaborator is in Australia.

FEMALE MODERATOR: Cool.

MALE MODERATOR: That's a good question. The reason I'm asking is if you're looking for an established connection, we've been talking about building trust, limiting time, having an award system. It seems like a preexisting relationship would dissolve the border that would be there institutionally. So if I had someone I went to school with 20 years ago, and all of the sudden they're our collaborator. Things along those lines. I might be leading you down a different avenue here with my line of thinking right now, but that's sort of where I want to go with this in terms of talking about across institutions. So if anyone can share an experience or two with collaboration of, with someone that was easily outside of your wheelhouse, within your geographic area, in a different time zone or a different hemisphere. Anything that you could elaborate on would be appreciated.

SPEAKER #6: Well, I would follow with that I think that collaborations, that there is no institutional or geographic border. The determinate is whether you trust the person or not and you've had good working relationships. So with technology today you can work with anybody anywhere in the world and I don't think there is an-- I collaborate with some people at different universities when I could collaborate with somebody internally in my own department, but I have a better relationship with the person external to the organization, so that's who I'm going to work with, despite the fact that somebody else might be two doors down from my office.

SPEAKER #5: I think ease of working with the person takes priority for me. That is from institution or from a different state or from different country. How easily or how conducive is the environment to work with him. I collaborate with Italy, India, Tanzania, all of those places. And we talk definitely as we need it to be – Skype or conference calls, something like that. I don't find the institutional barrier as a decision factor. Typically if we meet in a conference or somewhere as a kind of common venue and they come with the idea and it's easy to work with him. And this is how typically I go for it. In the same year I may collaborate with my department colleague, I may not. It's not something I push myself to do that within the department. That's why I have collaborated. It has to be the idea and the ease of working.

SPEAKER #4: Yeah, I agree. It's that whole trust issue more than geographic location. These days you can work with anybody anywhere if it's a good skill set match and a good personality match.

SPEAKER #5: Yeah.

MALE MODERATOR: I tell you, what it makes me think of is those ensemble cast movies where you have, you know I'm thinking like *Oceans 11* where you have one bit part, and you

know the guy that you want to fill that specific role. And that's where my head is going when I'm hearing some of your comments. Is that sort of how you define research projects or how you want to build your team in order to find a very specific person for that skill set, so to speak?

SPEAKER #2: Well, I think he just sort of hit the nail on the head from my perspective. There are people I seek out for those kind of reasons who are specialists who can help fill a need, and then there are people I have personal relationships with, who I trust both personally and professionally. And so I think it's a little bit of both – a perfect professional match or a fit for a skill set, and personal aspects as well.

FEMALE MODERATOR: So for these people that you seek out that you don't necessarily know, and you said, "I think they're specialists," how do you determine that? Is it based on publication, or number of publications? Or what would be the factors that you would be looking into to decide, "I'm going to contact Dr. X versus Dr. Z," if you don't know them?

SPEAKER #2: It's a small world and the honest truth is, you know, we-- even if I don't know someone incredibly well personally, I know an enormous-- what an enormous number of people do for a living and what they're specialty is. I edit a journal. Part of my job, editing a journal, is knowing who does what. But yeah, I mean at the end of the day, it's a small world and sometimes you come across people, but sometimes your colleagues will know people. But yeah, I don't cold call people, but occasionally I reach out to people that seem like a very good fit for a skill that I'm missing.

FEMALE MODERATOR: Mm-hmm.

SPEAKER #4: I'm not sure that it's a small world in the multidisciplinary approach. I mean, when I need somebody that's very far afield from the kind of work I do, I don't know them or-- but really, what I'm looking for is some kind of intermediate third party that, you know, I know somebody who knows somebody kind of thing, because they can give me some feedback on if they've worked with them or if they've heard that they're a good person to work with.

FEMALE MODERATOR: And even help in the introduction, right?

SPEAKER #4: Yeah.

FEMALE MODERATOR: Okay.

MALE MODERATOR: So you're almost discussing a personal vetting process. So whether this person can vouch for the integrity of another individual, or whether or not they can grease the wheels so that they can remove themselves from the middle person, and then you can have the dialogue with the other individual that you don't know.

SPEAKER #4: And it doesn't have to be a major connection, but just enough to get that started. You know, "This person seemed to be pretty good to work with and here's a contact, use my name."

FEMALE MODERATOR: Mm-hmm.

SPEAKER #6: I would just also add that – and I don't know if folks have had this experience also – but you know, there are some folks out there that might have this skill set that you're looking for, but oftentimes there's more than one person. And if someone is a really difficult person to work with, sometimes I would expect, at least for me anyway, that you sort of try to avoid those people. Because you certainly don't want to introduce somebody into your project who is toxic, has a toxic personality, and could end up making the project very unproductive. So I would agree with everybody that it's multiple things that you're looking for when you're trying to build a team to complete a project. But that's one of the beauties of having an informal network is, you know, somebody might be a world renowned whatever, epidemiologist, and so and so, but if you're talking to somebody you trust and they say, "Man, that person is just impossible to work with," that's certainly going to be a consideration of whether you each out to the person to see if they can be part of a project or not.

SPEAKER #1: You know, one bit that I'll toss in there that hasn't come up is, in the two projects that I've done that have been almost wildly interdisciplinary. Like, going to a field that has no overlap with what I traditionally do – with the art program being one of them. There is a certain element of when you get a contact and you reach out to that person, kind of bearing your own throat, I think, in the process. I mean, part of the success we've had here with the art program – and granted, this is on the same campus, so geographically it's easy. But you know, I really tried to present myself well to some of the art faculty that I've since collaborated with and designed curricula with, because it's easy enough to show them my CV and say, "Here's my publications," and it doesn't mean anything to them. In fact, the art in particular, their criteria, their checklist for accomplishments looks so different than a list of journal publications, that it's kind of hard for even me to evaluate whether or not they're really good at what they do. So yeah, that took some time. I had to go to lunch with number of people and ask what they thought about training students in science and where we might have some overlap. And I was aware of them kind of poking at me in ways that you don't get when you go to a conference and are asked questions. And I had to be comfortable with that.

MALE MODERATOR: So it's almost like an interview process at that point, where you might go-- trying to go through and meet someone and see if they're a good fit for your team, but you're not explicitly saying, "Hey, I'm asking questions to see whether or not we're going to work well together."

SPEAKER #1: Yeah, kind of a guised interview might be a fair way of putting it. I mean, I think most of – in this specific example – most of the art faculty find it strange that somebody comes to them from ecology saying, "Can you help me train my students?" And they don't really get why I want to do that. And part of it is personal. I see value down the road in teaching students to reach out more for general communication. But, it's not like the university requires us to do that, and they were sort of curious why I was coming to them.

FEMALE MODERATOR: Okay. So let me move a little bit from what we've been talking. And I kind of want to ask you how important it is for you to collaborate with individuals who would use their research to make decisions. And by that I mean, people that the results from

their research could be used to maybe inform the population for better decisions or policymaking and things like that. Not necessarily research that would just stay within academia. Does that make sense?

SPEAKER #6: I think that's a lot of what we all do. I mean, if you're in environmental work, a lot of your work has very big implications for policy, and I think that for a lot of us, that's part of our job is to translate your research into something meaningful beyond an academic setting. And certainly some funding agencies, like if you were to look at NIOSH, the National Institute for Occupational Safety and Health, with their current administrator, they have a very big push for something they call RtoP, which is Research to Practice, and they pretty much won't fund anything unless they see a funding agency that you can actually translate your research into something meaningful. So the trick is, is once you build your team and do the research, then you have to figure out a way to communicate and disseminate that information to decision makers, and that's definitely something that you absolutely have to do to be effective.

SPEAKER #4: We don't have to do it in our interdisciplinary research, but when we can it's a big plus. From my point of view, it's a major reward, so it makes me more interested in doing it. So when I work with the food safety individuals and then watch a regulation get drafted based upon the research that we did, that's pretty neat. That's a big reward system.

SPEAKER #2: In my case it's fundamental to what I do.

FEMALE MODERATOR: Okay. And how would you do that? So I guess what I'm trying to get from it is, you know, if there is an application, how would you communicate that? Is it through-- I mean, I don't -- I think that if you just did that through a scientific journal, you would still just be within the scientific community, right? So do you try to have interactions with journalists, or do you try to have a press release from the university? How-- do you Tweet about it? You know? I guess--

SPEAKER #6: Well, for at least in my case, I've taken a couple different approaches. Usually for me it's direct interaction with the agency, the applicable agency. And I worked for many years before I came to academia in governmental agencies. So as a consequence, I have a lot of relationships within those agencies and EPA and other organizations, but usually it is personal relationships – making sure that the agency personnel, who are the decision makers, are aware of what you're doing. In some cases, agencies will actually have and request presentations, and in other cases, sometimes somehow your work comes up. We did a project on nuclear emergency preparedness and somehow – the New York State legislature is passing a bill, and somehow they found our paper when they searched for it, and they contacted us directly and said, "We want to speak to you about it." So it seems like it happens multiple ways, but there certainly are a lot of advisory groups that EPA and OSHA and other organizations have. And if you participate in those advisory groups, it gives you a direct link, a direct communication pathway to the decision maker, the policymakers, or the agency deputy directors or just, you know – and you can communicate what you're doing and finding through a lot of those advisory groups. Whether it's the Clean Air Scientific Advisory Council or whatever organization is out there, those mechanisms are in place with government agencies. And that's why it's very useful as an academician to be on those advisory panels and so on, because it gives you access to personnel

that have a vested interest in policy.

SPEAKER #4: There's also a lot of industry stakeholder groups that you can work with. So during the course of a meeting, we'll typically try to arrange some meetings with the industry organizations so that they know what we're doing. But also, we can get feedback on how to improve the research. They're generally interested in that kind of stuff. Especially if they think it's going to impact the regulation down the road.

SPEAKER #2: Yeah, I would probably echo all of those comments. I have spent a lot of time developing personal relationships with people in federal and state agencies, so that there is some potential of my research having an impact. Agency stakeholders have often reached out to me. And then I think frankly simply having a profile within your research community. Again, for me, I think maybe not directly, but it's a small enough world in the sense that if you give a lot of talks and people know what you're doing, they-- someone may not know you, but they know someone who does know you. And they ask, "We're interested in developing regulations on X. Who has some expertise on that?" So I think, again, personal relationships within agencies, and then also just simply having a profile within your own research community is very important because people, they reach out. And so I guess I'll leave it at that. I'm just echoing the last two comments.

SPEAKER #5: Yeah, I'd like to add to that. I also try to reach out to the industry personnel, and I feel it's best to reach out to them at one of the conferences and all. I just want to say what I am doing and what's the practical application in their industry, and I make them aware that this is what we do and if applicable, we can talk about it. And I share my presentation with them, I try to contact through LinkedIn and social media also. But this is how I try to disseminate what we do and there might be some stakeholders outside.

FEMALE MODERATOR: Does everyone else use social media?

SPEAKER #5: I use extensively LinkedIn.

FEMALE MODERATOR: Okay.

SPEAKER #1: I'm not much of a social media person myself, but that's interesting because it's explicitly part of the skill set that we're trying to give to students – not to say that they have to do it, but that they have digital illustration and web design skills that they can do it if they chose to. You know, there are certainly some exemplars of very good scientists that have been very outspoken by their own hand through the internet, and have done it in such a way that it hasn't cost them their scientific credibility. So, you know, the typical grad student is not going to become Stephen Hawking right away, but maybe that's kind of a cultural shift. We've certainly found that quite a few of our young students are interested in trying to maintain some sort of public presence of what they do via the internet so there's probably more of a role for it down the road.

FEMALE MODERATOR: No love for Twitter in this group here, huh?

SPEAKER #6: The only thing I've used social media for is LinkedIn for my students. So you have a preexisting relationship with your students, they graduate, and then they move on and get promoted and eventually become those decision makers and you're still connected to them through LinkedIn. But you already have the preexisting face-to-face personal relationship with them. But, you know, some of it could be generational. I'm not that good at social media. My kids I'm sure are awesome at it, but I'm not. So, you know, maybe it's just a generational thing.

SPEAKER #1: It takes time, too. I mean, that's why I don't do more of it myself. But I have-- that's one of the things I learned early in this art process is it's not real quick to set up a nice blog and keep it maintained.

FEMALE MODERATOR: Yeah. And from the moment you commit to it, you have to be committed to it, right? You need to have the daily posts or the weekly posts, otherwise people lose interest.

MALE MODERATOR: I just want to ask a question that kind of just popped into my head as we were talking about this. Is the idea that self-promotion and using social media to push out your own research as opposed to having people pulling it from you? Is that something that you find to be not on par with the job responsibility or is it just something that's limited and I think someone mentioned it, about a generational thing with the technology. So is it more ethics and morals and your personal research goals, or is it more technology Luddite-ness?

FEMALE MODERATOR: That's a good question.

SPEAKER #2: I guess I will throw in my two cents which is, in my case it's neither. I think that -- I think that shameless self-promotion is a big part of being an academic. Just full stop. And I don't love it, but in many other domains I do it. I give a lot of talks, I go to a lot of conferences. For the purpose of learning things, but also for self-promotion. Why don't I have a very active social media presence? I guess my personal interpretation is, for me, the benefits don't outweigh the costs. When somebody asks me to contribute a blog post and it's a blog post that's very well read, I'm happy to do it. But in terms of maintaining my own blog, as I said before, my big constraint is my time and to me, it just doesn't seem like these things have huge payoff for me personally and for the kind of work that I do relative to cultivating relationships with people in agencies, relative to maintaining visibility in my profession. Otherwise, I wouldn't necessarily think this would be true of everybody, and so I think for other people, it is very likely that the benefits may outweigh the costs either because they like doing it or because they have a different specialization that's very helpful. So for me it's neither of those things. I will confess to finding a little bit of all of the self-promotion in being an academic a little distasteful and a little unpleasant, but it's a huge part of the job. And so you know, I do it. Just not through this particular channel.

SPEAKER #4: I agree.

SPEAKER #6: I was just going to say quickly, I also often wonder if some of the social media is-- there is just so much out there that how is anything that you would post going to be distinct from the million other posts that are out there from anybody under the sun?

MALE MODERATOR: Well, we're-- if we don't have any other issues on my little Pandora's Box question, we can move on.

SPEAKER #1: Can I toss one more thing in there?

MALE MODERATOR: Yeah.

SPEAKER #1: One of the things I worry about with the students, because a couple of them have done a really good job of creating kind of a digital presence for themselves, I would hate for that to become something that, in their minds kind of sidesteps kind of the legitimate scientific review process. You can put anything you want on your website. We don't want the kids to get the idea in their head that they can post garbage. So our hope is that they're going to do a good job with their thesis, they're going to do a good job with their dissertation, that learning about communication arts and web design is just icing on the cake for them. But to be fully honest, I'm not sure I have a good kind of way to kind of keep checks and balances in that. I mean, it's kind of, you give people the skills and to some degree you kind of have to turn them loose, and this is an experiment for us. But I think about that a lot. Kind of the quality issue.

SPEAKER #3: I think having a good web presence is very important. I just don't think that social media might be the appropriate method to do it. I think that having a good professional website that explains what you do and sort of why it's important is really important. I think as Jay said, not only for the self-promotion, but also so if people are looking for somebody maybe to reach out to they can find it on your website. But a lot of times, I don't think social media is the way to do that.

FEMALE MODERATOR: Okay.

SPEAKER #5: I'd like to add to that. If I'm trying to reach out to someone and the first thing I do – one is I may have personal contact so I can reach out to them. If I don't know, and I'm trying to reach out to someone, I try to search about them through the websites and all, and try to get all of the information what is out there regarding him, which projects and all. And then I try to contact them. So being on a kind of web helps, and also can be the individual websites also. That's fine, but that helps a lot.

MALE MODERATOR: That's actually a fantastic segue into our final section or line of questioning. We've been talking about channels and platforms and establishing communication with collaborative partners. But if there was a specific organization that wanted to help you make these connections, for research or for research interests, how would you feel about that? And if you have organizations that do this kind of thing, do you utilize it? Have you turned away from it? Are you aware of it? So a multilayered question there.

SPEAKER #1: Can I jump in first? Because that kind of goes back to one of my first comments. As a relatively new faculty member, that's where I've learned to be skeptical pretty quickly. You know, my university and then other types of institutions, they do think about trying to who to introduce you to, who you might work effectively with. And those kind of spoon-fed

collaboration have usually, in my case, been the ones that didn't go anywhere. You know, everyone on this call pretty much has been saying how important it is to have a personal vetting system and prior knowledge and trust. And yeah, that's definitely turned out to be true in my case. When I've been a little bit too willing to look into an idea that one of the centers here at the university here has – "Oh, it would be great. You're good at this and so and so does this. Why don't you guys get together?" Those have rarely, if ever, worked out and gone anywhere.

FEMALE MODERATOR: Do you have any idea why? I mean, because you know, if it's already there, why it would not go anywhere and then when you go out of your way to make those connections it works better?

SPEAKER #1: Well, my very cynical answer would be, I think that some of the well-intentioned people whose job it is to kind of create some sort of infrastructure and network, for example, for faculty at a common university to utilize, I don't think they tend to be successful researchers with a track records of grants and publications and might be a little bit naive about what it's going to take down the pike to get a good paper out. You know, those things kind of boil down at the end of the day to, are you willing to stay up until the wee hours of the morning and get this done. And I don't think people are usually willing to do that for the projects that aren't really, really the most core important things for them.

FEMALE MODERATOR: Mm-hmm. Okay.

SPEAKER #6: I would second that, too. I totally agree that those sort of forced – we call them sometimes, at our university, "speed networking events." And I don't even bother going to them anymore because those forced, introductions, I don't know what it is, but I've had that same exact experience where they don't typically pan out, they don't work out, they go nowhere. And I don't know if it's just because you can't administratively force human interaction or relationship building. I don't know what it is. But I too have had a same experience where you go to these – some person in a very sterile, static way is looking at a website. They don't know you, they don't know the other person. They say, get together and talk. You do it. You get together and talk, but that doesn't necessarily build a relationship. That's just a meeting and a lunch. So I too have had that same experience where those forced things rarely pan out to something meaningful.

MALE MODERATOR: Are there any software applications or web-based platforms that you use to get information about potential...we mentioned LinkedIn, but are there any others?

SPEAKER #6: For me personally, I don't know if it's generational, but there's nothing like word of mouth. Somebody you trust who knows somebody, a friend of a friend, or in your small community of people that you know, there's looking at somebody's webpage can be helpful in maybe identifying somebody or searching for somebody. But if you're in your field and you know the people in your field and you know what people are doing, the value of just the blind search and a cold call is not nearly as valuable as talking to people you know.

SPEAKER #4: I agree, but it doesn't even have to be in your field. We know enough people across campus in lots of departments that we can usually get some kind of feedback on people.

FEMALE MODERATOR: Mm-hmm. I think you wanted to say something, too.

SPEAKER #1: Just a specific detail for your question. The one that I've seen that is the most impressive, the most sort of connection tool is ResearchGate. It's building up quite a large presence and if you read the philosophy behind it, it's trying to become the next generation of LinkedIn which I don't think it is yet, but it's a nice system for looking up topical. Because not only do you get sort of the network connections on ResearchGate, but they built it to host a lot of content as well so people that are allowed to post PDFs of their papers, there's a big Q and A type blog on it. You know, "I have a research question. How would I deal with something -- how do I deal with my instrumentation in this kind of river when nothing is working?" And so you can actually get some real-time feedback from other people on the websites. For ecology, at least ResearchGate has become something that almost all of us are starting to maintain our presence on.

MALE MODERATOR: We kind of touched on something that I wanted to follow up on and that's open – it doesn't have to be limited to ResearchGate or anything online. But it more gets at the heart of how you acquire information and how you want to acquire information. Is there a specific way that you go about searching? Do you do it based on topic? Do you do it-- we talked a lot – extensively almost, exclusively even – about personal relationships and using that as a source. But in terms of if you wanted to acquire information about available opportunities or collaborations or research issues, how would you prefer – in your own idiosyncratic way – of acquiring that information?

SPEAKER #1: I'll speak up again. I have found that there is no substitute for doing the homework and actually doing the research on the people that you're thinking about working with. There's nothing that makes a better first impression when you meet someone when they say, "Hey, I read your three paper on this topic and I thought that was really interesting." I mean, just being able to recite some of the work that someone has done clears so much air immediately that you're taking them seriously and you know about them versus just saying, "Well, I saw on your website that you work on this topic. I've studied you some. I've read your papers. I've put that time in.

SPEAKER #4: But how do you do that when it's interdisciplinary? I've got a meeting after this one, one of the people there does EEGs. I know nothing about them. I've tried to read her papers. I can't get through them. They're just not my field. What I know is that she knows – we had both worked with a third party and we both, that third party speaks highly of both of us I gather. So we're quite willing to work together and put the time in to learn that kind of language that we talked about early on. But some of these interdisciplinary ones, I can't do the homework of reading their papers and making that kind of connection.

SPEAKER #1: That's a good point, and the other really interdisciplinary thing that I've done has been, I've actually done some scholarship in the law review literature based on endangered species type policy. And that, I've been able to search people out, but that did require me to basically take law school classes, and we're not all going to do that for all the other disciplines, so that's an unusual example. But you're absolutely right. Like, pick up a law review journal and try to make heads and tails out of it. It's like people talk on TV in law shows. I mean, it's so

longwinded and roundabout. Yeah, I stand somewhat corrected based on that comment.

SPEAKER #4: I didn't mean-- if it's somebody who I can read their journals, I absolutely think that's a great thing to do. But I think there's a limit to how far that can extend out.

SPEAKER #1: Yeah. I would agree.

FEMALE MODERATOR: So do you think if ResearchGate, for example, had a – I don't know, like, a rule – that not only you can post your papers, but to help you to make better connections you have to have one-page summary in a lay language of your paper or something like that. Would that be helpful? So then you're cutting, you know, the problem of not understanding the language. Now you have the whole paper for a five-year-old to understand. Is that something that would be helpful?

SPEAKER #1: I don't want to speak out too much here, but possibly. Actually, a colleague of mine actually just co-authored a paper in PNAS where they were calling for the editorial board to require some sort of – I think they called it the layperson abstract. So that sort of idea is being kicked around. But I'm not sure. Like, if you read an abstract and you're not a specialist and it sounds really interesting, is that in some way just kind of saying, now look at the technical content that you're not going to get access to. You read the one paragraph abstract, but you still can't read a paper. I'm open to that being in progress, I'm just not sure that it will be.

FEMALE MODERATOR: Mm-hmm. No, it's a beginning. It's a start, right?

SPEAKER #6: Some journals do require like, an implication statement, or they'll require a little box up front. So sometimes that even can kind of be helpful. You just read the short abstract. Maybe you don't know really exactly what's going on, but at least it can give you a little bit of a sense if it's something really outside your field. Yeah. I have a question with research papers. I was never sure if it's a violation of copyright to actually publish your PDFs of your papers on ResearchGate.

SPEAKER #1: They are specific, and if you look at the fine print in your copyright agreement when you publish the paper, some of them say it is like, a three year – that's pretty typical – it's a three year window and you're not supposed to--

SPEAKER #6: Oh, interesting.

SPEAKER #1: But it's publisher to publisher though.

SPEAKER #6: Okay.

SPEAKER #2: Going back to the layperson abstract issue, I will just say that I think this is a fabulous idea, but for other reasons than we're discussing. I think it's important so that research has more of a potential impact on the rest of the world, and so I think it's incredibly useful, but I'm still going to pick up the phone and look for somebody that somebody I know knows and trusts. And likewise, I fully expect that if I were to cold call someone that they would be a little

hesitant and a little suspicious. If the connection comes through someone we both know and trust, that's going to be different. So I think what you suggested is a very good idea, but not for the reasons that we're currently discussing.

SPEAKER #4: Ditto.

FEMALE MODERATOR: So when I asked about the research having more of an application and we're trying to get on the end user collaboration, you all mentioned policymakers and stakeholders, but I don't think anyone – or maybe I didn't pick that up – thought of the general public as being a part of the end user, right? So maybe having your lay audience abstract would help you to promote your research on that group.

SPEAKER #6: Well, we've done-- for us, we do a lot of public health work so for us, reaching out to the public is important. And typically what we've done and what's been really helpful even in our grant reviews with an organization like NIOSH is we will actually – say we're doing research on lead exposure among remodeling contractors. NIOSH actually required it, so we actually published lay articles in newspaper magazines, remodeling websites, this poplar press articles. So we actually do oftentimes [inaudible] so the organization that we're seeking funding enjoy that part of it, but it is a big effort to reach out to the poplar to try and reach the public. And I'll tell you [inaudible] getting articles published in *Parenting* magazine about lead exposure for pregnant women that they have in technical journals sometimes of various reasons. But at least for us, we are very cognizant. Our funding agencies really do like that part of our application, to go beyond just publishing in the technical journals, peer review journals, but also to reach out to the public. So we do do that, and that's important I think.

SPEAKER #4: And when we talked about industry stakeholders, a lot of those for us are NGOs that represent the general public concerns about food safety, so they're brought in on the early part of the projects and really see what we're doing going along.

FEMALE MODERATOR: Mm-hmm. Okay.

MALE MODERATOR: We pretty much, without asking directly, we've got the-- one of the questions that we wanted to ask is what problems or pitfalls you would see in having some system, in quotes, in place to build these collaborative relationships. So if any of you have any other concerns that we have not addressed regarding having an intermediary that you did not know and personally trust to establish relationships, whether or not it is – well, my favorite was speed networking events or what have you. But if there are any other pitfalls or problems or concerns about something like that, feel free to go elaborate on that right now.

SPEAKER #6: I think with our last comments, I would just mention something I thought was interesting for us is to make a great long story short, we published an article about lead safety for fishermen who cast their own lead weights, and what we found very interesting is we did all of these studies, published these reviews about lead exposure and we all know how bad lead exposure is. But one of the challenges that we had trying to communicate the results to the public is that the editor of *In-Fisherman* magazine, where we published this public outreach article, basically told us, "I don't care about the research that you've done. The people that read

my magazine love fishing. Any professional fisherman love casting their own fishing weights, so we're not going to do what you're suggesting in your technical article that people should do to protect themselves from lead. So we're not going to publish your article." And we had this big debate between ourselves about, if we don't say anything and don't inform anybody that doesn't help anybody. So how do we take what we've done and modify it to get that message to the public so that at least something could be done to prevent lead exposure. So that was kind of the experience that we had, is having to actually modify what we were trying to say just to make it amenable to the person who is the vehicle for us to communicate that to the public. And I don't know – that's my description about it, but that was something that we had come across in the past that we thought was interesting.

MALE MODERATOR: Any other issues, glaring problems, that you would foresee in the burgeoning world of online information brokering?

SPEAKER #3: I think that maybe sometimes when people think you do something different than you actually do, if they just briefly look at your website and they don't actually read in detail what you do – I've had colleagues come up to me and say, "Well, don't you work on so and so?" And I'm like, "Well, not necessarily." And I think if somebody like that tried to force a collaboration, that's obviously not going to work out too well.

FEMALE MODERATOR: Okay. So just so we can finish, I'm kind of surprised nobody is curious to know what was the agency that we were talking about. The first time we did that focus group everybody wanted to know. But we've been funded by Virginia Sea Grant to try to figure out how they can help the partner institutions doing multidisciplinary collaboration. So now that that's up there, is there any suggestions that you could offer?

SPEAKER #2: I will just say something that you may find amusing in light of the conversation that we've been having today, which is I looked up the PI's website and back-saw that this was Virginia Sea Grant.

SPEAKER #1: I did, too.

FEMALE MODERATOR: So you all knew it already?

MALE MODERATOR: That's pretty smooth. So you know, in terms of kind of just acknowledging that we're going to look up someone and multidisciplinary research and you didn't know about them, you do your due diligence and find out who they were so you could have at least a talking point if the conversation came up.

SPEAKER #2: Yeah. In this particular case, I don't know that's what it was about. Again, you know, like the rest of us, my time is valuable and if I'm doing service to the community, I want to make sure that it's to an organization that I'm actually somewhat interested in. So I'll leave it at that, I guess.

SPEAKER #1: Yeah, based on my e-mail, that's pretty much the exact same response you got. I was asking for more a little more information. Is this worth my time? And I did, I backtracked

the grants to the PI's website. He's got it posted.

FEMALE MODERATOR: Okay. Did you all have a chance to look at the Virginia Sea Grant website? Are there any recommendations you have about how the information is set up there? What are the types of research they've been funding, et cetera, et cetera, et cetera?

SPEAKER #1: No, as feedback, I feel like Sea Grant does a pretty good job of getting the information out. The funds they're trying to make happen. Not having a Sea Grant doesn't mean that it didn't happen.

MALE MODERATOR: So yeah, I guess that pretty much closes everything out so if there's anything that you wanted to talk about regarding any of the topics that we covered, now is the time. One of the things that we found particularly interesting, at least for me, as someone that's provided service in the past, I have to pretend like I know what I'm talking about when you have a layperson wanting to acquire information. Whether or not it's records of the EPA or the Department of Energy or the Associated Press broadcast. And so I find that Virginia Sea Grant are in a very unique position where they can make the connections between a lot of their different affiliated researchers and audiences. More so than I think a university could because there is still a limiting factor especially with tenure and promotion and stuff. But I think it's to be seen on how much foot traffic they can get and interest they can get and buy-in from affiliated researchers and the institutions within each state. And certain portions of Sea Grant are doing things differently, so we're just trying to see if anyone had any experience with Virginia Sea Grant in their professional past. So that's just a curiosity. A fascination with me. Now you know a little bit about me before we end the phone call. You can Google me.

SPEAKER #1: Let me toss out some feedback there, too. So and the others might think this the totally off the wall, but in terms of Sea Grants specifically, I'm thinking about networking, whether Sea Grant itself can kind of help fill that role. I'm going to guess they'll be for successful if they approach people with a clear kind of problem or work statement. "We want to improve crab health A it's going to involve an economic component, it's going to involve an ag component, it's going to involve a fisheries component." You know, that's probably an area where they can do really well to have done their homework, contact specific experts and then if in the interim they say, "By the way, this would involve some grant money to sweeten the pot," they could probably be really effective in doing that. But if Sea Grant just kind of tosses out there, "We want to have an interdisciplinary working group to think about this topic," I'm going to guess that's probably in the area of more likely flop, but I might be wrong there.

FEMALE MODERATOR: Okay.

MALE MODERATOR: That's good feedback. Anyone else? Cool.

FEMALE MODERATOR: Okay.

MALE MODERATOR: Let's close it up.

FEMALE MODERATOR: Well, thank you so much for taking your time. We know what

everybody is super busy and summer is usually the time where a lot of research is going on so we really appreciate you taking, this one and a half hours to meet with us and get your input. If you have any questions, feel free to e-mail me or Raph. You have his e-mail already. Mine is on the informed consent. So--

MALE MODERATOR: Yeah, and feel free to contact me if you're interested or you have any follow up questions or if you're just curious. I'm available. So I really do appreciate it and I thought we got a lot of good information today.

FEMALE MODERATOR: Yeah.

SPEAKER #2: Good luck.

SPEAKER #4: Yes.

MALE MODERATOR: Thanks a lot.

FEMALE MODERATOR: Thanks.

MALE MODERATOR: I appreciate it.

//END

Appendix 4
Focus Group Transcript: July 30, 2015

GMU Misc 30 July 15

FEMALE MODERATOR: Do you all agree to participate in this discussion today?

GROUP: Yes.

FEMALE MODERATOR: Great. Do you want to start?

MALE MODERATOR: Yes, So, I don't know if you guys have done any digging trying to figure out what our research is on specifically or not, but on a broad scale we want to talk about collaboration research across multiple different avenues. We don't really want to tell you what that means, we're hoping that you can tell us what that means. I would imagine its case specific on your department, what kind of research you're interested in, what kind of courses you teach or what kind of institution you're working for. We're hoping to get ideas on how to improve collaboration and research so we'll just ask you to talk about stories, past experiences, whatever kinds of pitfalls or challenges you've run across and ways to make it a little bit better, in your opinion. We're looking at an hour, especially with just three of us, so we might get out a little bit earlier than anticipated. So, the first set of questions that we want to talk about is the very broad idea of multi-disciplinary collaboration. If you could highlight any specific challenges in your past experiences that you've had in making connections. We can talk about the back end of it as well if we want to start out in sort of a time line, the challenges in finding the people to collaborate with in research. Feel free, open floor. Wherever we go after that, then we'll just pivot.

SPEAKER #1: If you want I'll pitch in because my department, because of its nature, is multi-disciplinary so it's one where there is sort of a tremendous amount of collaboration that goes on and more or less has to because there's not a critical mass in any particular disciplinary part of the department to really be able to function without working with the other parts. This was not something that happened early on in the department, there really was a lot of, sort of a lot of tension about that because we had people from other departments that had been jammed together into this department. The Geology Dept., the Geography Dept., Atmospheric Sciences, I'm not sure whether it was its own department or where it was and then they all took the Ecologists out of Biology and stuff them altogether so our T-shirts used to read, "The Orgy of the Ologies" [laughter]. One of the things I think was critical to things working is actually time and that also holds in terms of my experience with long-term ecological research network because these are projects that are funded at six-year time intervals and tend to be renewed it means that you have a working history with lots of people that might go back a decade or more and that makes it a whole lot easier to do collaboration because you know the person, you've worked with them before, everything gets sort of easier after the first time. That being said, there are some people I know in the network that I wouldn't collaborate with on a bet because I know that I will do the work and there name will be on the paper and mine might not be so that definitely plays into it. Generally speaking, what happens is that tends to select for people that actually can work in that environment; that can collaborate. I'll forward over to somebody else.

SPEAKER #2: I'd like to echo what was said in terms of bringing people together about a little over a decade ago the Environmental and Water Sources Group, Water Sources being mainly Hydrology, in our department merged into one and we 'til today still have a dividing wall. It's hard to talk across that boundary for many people and hard for them to appreciate what the other person does. I actually have had varied experience talking to people across departments in colleges rather than sometimes within my own department and have been on multiple, sort of multi-disciplinary collaborative research projects. We recently got a grant to study epidemiology in Botswana for a river. I'm going to do the water quality monitoring, somebody else is a Geologist, somebody else is an Epidemiologist and each of us has a different vocabulary and just understanding the vocabulary took many moons. This was our second go around on the proposal that finally succeeded. The first one was so stilted because it sounded like one person was putting their stuff in and it didn't sound like a smooth document. It didn't flow as well and I'm sure that anybody who has done this before has faced the same thing, at least initially. It's very difficult to get that smooth collaboration going unless you've tried it a few times. There is another aspect, many colleges and departments have a very different focus on what the reward system is. In engineering most of us are like, "How many research dollars did you get? How many papers did you publish?" That's generally the basic thing but when I collaborate with somebody in the business school, at my university the business school doesn't even have to raise any money. Putting it quite flatly, I by myself was raising more dollars in one year than the entire business school. They didn't have to do any funded research, they could write their papers and all without having to do funded research. So, bringing a person from that school to collaborate, what was the reward system for them? I don't know and, of course, I had a little "in" because I knew that person's spouse who worked in my department so that's how I got that person interested. But, without this connection it would have been a little bit more of a challenge unless that person was truly, truly interested in that particular topic. Those kinds of collaborations are really hard to initiate and once initiated it's truly based on personalities. If you get along with each other you find the time to understand each other and give each other credit. If you don't get along, even one person can poison the entire pool and that is sort of a sad experience but it happens repeatedly. And I will throw the ball to whoever wants to catch it.

SPEAKER #3:: I think I'm the only other person on this call. The original question was, What are things that can promote the collaboration and honestly, I haven't had, I agree with what my two colleagues have said, but, to me it's pretty easy just because I'm interested in a multiple number of things and so, if you kind of have friends in other departments you just say, Would you like to work together? I've never lacked for interdisciplinary collaborators. I've never had to worry about how do I find this person or not. I do have a different background. I have degrees in both of the fields I work in so I have content knowledge in both fields and it's not a big issue finding it although.

Your point was interesting about collaborating with folks from different departments in different reward systems. You're absolutely right. As a business professor I don't have to raise money but my engineering colleagues are all about, certainly, funded research. That hasn't been, from my side, since I don't need to raise any money it's not been a problem but for their side there may be an unspoken problem and they're wondering, How come I'm not bringing anything to the table? Whereas they bring stuff to me and I say, "Thank you." So, that's an interesting

thing, it's not part of my thought. In terms of working together that's not been a problem. We like to say here at Virginia, we do a lot of interdisciplinary research because we like each other. I think that's how it works out, we generally like each the people that we work with. To another point, if it's not working out then you don't work with them again. It's a great gig, it's a free choice.

SPEAKER #1: Jumping back in now also building on the rewards system issue, one of the things about our department is when it initially started, right now sort of our four "core areas" as it were, Hydrology, Geology, Atmospheric Science and Ecology, the thing is, initially, Hydrology wasn't one of them and what was there was Natural Resource Management. That mostly had people that came in with engineering backgrounds but we ultimately had to abandon that part of the department or that coverage area of the department because we could never get them tenure. What would happen is in their fields a publication was a proceedings publication and so they had lots of proceeding publications and then it would go over to the Dean of Arts and Sciences and the committee there and they'd go, "Hold On, Where are the journal publications, we have only proceedings here. Proceedings don't count, where's the publications?" So what we found is that we were in a position of hiring people that essentially had very little chance at actually getting tenure and so we basically sort of moved away from that area because we couldn't, sort of make the rewards system. The issue was at a different scale than just the departmental scale in terms of making that work. The rewards systems are definitely sort of a challenge to it.

MALE MODERATOR: One of the things that you guys have highlighted is time and you can skirt around time because of pre-existing personal relationships or whether or not it's a shoe horn with multidisciplinary programs into one umbrella department, but, in terms of your time commitments, is there anything that you'd like to elaborate on the negative side of trying to have collaboration across disciplines?

SPEAKER #1: I think that maybe we're asking the wrong people because we're people that do like, that find there are the rewards for doing that. There are certainly some of my colleagues that, some colleagues here and elsewhere, that I know people that are so focused that anything other than their research is pretty much meaningless and those are folks that you don't collaborate with. You usually want to find people that are eager to collaborate and also, a lot of times what it is, is you're wanting to ask questions that absolutely demand collaboration. At the Virginia Coast Reserve Long-Term Ecological Research Project, if we did not have experts in Geology, experts in Hydrology, experts in Ecology, all working together we couldn't really understand the system. If you're talking about a barrier island with wind, it's waves, it's vegetation, crapping sand. It's all sorts of stuff that's going on there.

SPEAKER #3: The only barrier that's a big one for me is actually physical location. I'm envious of my colleagues in the other buildings that are already with their colleagues. Engineering is a distinctly separate building and so the physical space, if I could wander down the hall and talk to them that would be better and I know that some of these multi-disciplinary think tanks actually co-locate multi-disciplinary researchers. I would like that to happen for us. That is a barrier, having to walk to someplace else as opposed to just meet them is important.

SPEAKER #2: What he said I can sort of multiply by about four because I'm sitting here in Manassas with one other faculty member and now two, as of today, besides myself. The rest of my colleagues plenty of them are in Blacksburg and I can't walk down the corridor. Having said that, I remarked about that divide between Environmental and Water Sources in my department that's partly because they're in different buildings. Just walking across 100 yards is just too much sometimes. We, up here, because we are isolated, we either have to do our own research or we have to collaborate. We've collaborated with people at George Mason, Johns Hopkins, University of Maryland and others and not just across our university departments but across universities also. We've worked with folks in ODU and so that has brought a different texture to our lives and I'm very Catholic in what interests me, bring it on, if it's air pollution, psychology of how stakeholders view water quality, all that interests me. Obviously I have to make my living and money and papers from some narrower field but I'm willing to work with a lot of different kinds of people. The toughest part about timing has been this location business and certainly this type of technology that we are using today has certainly helped a little bit but it still doesn't replace that when you're sitting in the same room you can shake hands with each other. You can see what they're eating, you can smell the perfume they're wearing and you can decide whether you like this person or not, do they have bad body odor or what? Those human interactions, at a distance, are difficult do to and I find the best collaborations are when you can actually meet a couple of times. Sometimes that means I have to drive 250 miles to Blacksburg and, even one or two meetings really enhances that work you can do together particularly when you've brought in one or two new individuals to the team. When you've got people who've worked with each other for years, that's not a problem, but when you bring in a couple of new individuals it's very helpful to get them sort of inculcated in the group dynamics, how does this group function. Each group is different, I've worked with certain groups that are working on storm water stuff it's mainly engineers and geologists and all and that group dynamics is quite different from when I've worked with folks in Natural Resources and Psychology and Business. They talk a very different kind of language and, incidentally, drink a different kind of beer [laughter].

SPEAKER #1: I was figuring that was going to come up as a factor at some point on here [laughter]. I might add that also fatty, sugary foods, one of the things that our department has started to do recently over the last several years is basically at 10:00 every Friday during the semester, donuts and coffee will be served and so what you then get is a lot of people in the room who, because their offices are in different parts of the building and they may or may not interact but it's a real opportunity to run into somebody and make that connection that maybe leads to something important. I would say also that, just plain as you're walking down the hall and just happen to see somebody in their office or passing you in the hall, those are all opportunities for exchanging information and maybe getting something kicked off. There's a lot of serendipity to it as well. I do have some counter examples to that too but I'll let someone else get in there.

SPEAKER #3: I'm good. I agree with all that. I think physical location is more important than we've agreed in the past. That's all.

SPEAKER #1: What my counter example is that I also work a lot with the information managers at the other LTER sites because each site is sort of responsible for managing its own information and obviously we have a lot in common in terms of the problems although

institutional milieus are different and also the systems that we're working in, how we're located. There are a lot of differences as well and typically what we've had is sort of an annual meeting that is two or three days that tends to be relatively intense, lots of talking about projects, lots of planning on collaborations, that sort of thing. Then during the rest of the year we're all out there on our lonesome and some of the video technologies have been quite useful for that. Though, it depends a lot on the size. If you're dealing with relatively few individuals then the video technology is much more like being in the room. If you have a large number of individuals it's almost impossible to have a free-flowing discussion because everybody is tripping over everyone else due to just that little bit of latency and the fact that you can't necessarily see that the other person is starting to talk. When we first started doing video technology people asked me what was good about video conferencing and I used to say that it's not the fact that I can necessarily see the people because I've got to find myself a better looking set of colleagues or, and I know that they feel exactly the same, but the big difference is you can see somebody raising a hand or leaning forward or getting ready to talk. Those sorts of things, that's where the video comes in as it gets rid of the phone part of the courtesy pause in order to let somebody break in. That being said, once you get into a larger group that gets to be really difficult to do. None the less, large groups still can be useful for video presentations if somebody is giving a talk about something, the fact that there are twenty people or a hundred people in the audience doesn't really matter very much. That has been my experience with video technology.

MALE MODERATOR: Well, you know that it's a shame that, obviously, in the summer the schedule is a little bit harder to nail down. Our original intent was to travel to all the universities within the state and provide coffee and donuts. I just don't have the donuts here because I didn't want to shame you into feeling guilty about it or something like that. The coffee, at least that!

SPEAKER #1: We have talked about having virtual meetings where we mail boxes of snacks, coffee and donuts and beer to the appropriate place.

MALE MODERATOR: You mentioned something, sorry, go ahead.

SPEAKER #2: I was just saying that the business about video technology has come a long way and it's far better than it was ten years ago but still, I'm glad this thing is not on Distance Teaching as that's a whole different animal. Collaboration is one thing...

FEMALE MODERATOR: Online classes and all that good stuff. I have a question. I want to touch a little bit more on the language aspect because I heard a lot about language and people from different departments speaking different languages and I can totally relate to that. Doing my Masters at WVU we had Ecology, Forensic Science and Developmental Genetics and we would all have to present seminars together and nobody could understand anything about each other's research. I see how, from that time on, I started seeing how language can be a barrier in multi-disciplinary collaboration so I was just wondering, is it only time that helps you to overcome that or is there any other strategy that you use to understand each other?

SPEAKER #2: We've used, sometimes, in the beginning, if we find a conflict, we have, like a little dictionary, meaning, essentially an Excel spreadsheet which says, "When you use this term it means this. When I use this term it means that and, can we agree on what it really means?" I'll

give you a brief example. To most people, we understand Aerobic and Anaerobic but there is a term called Anoxic which is somewhere in between. For an Environmental Engineer like me Anoxic means lack of oxygen but not the lack of other compounds that can replace oxygen like Nitrate which can provide an oxidizing environment but, to other people, Anoxic is exactly the same thing as Anaerobic. Those are some of the initial things that we had to overcome, when you've got a conflict, let's just write it down and when you're writing a proposal or a report, refer to that and use the term that we all agree to use even though it may make you feel like you're pulling fingers or nails to chalk board or something, use that term because that's the term we all decided we're going to use [laughter].

FEMALE MODERATOR: Any other suggestions?

SPEAKER #1: I was going to say that for us it's not necessarily the terminology so much as "What constitutes a problem? What constitutes a question?" That type of thing. I was at a workshop several years ago where they were looking at biodiversity research and they were trying to tie together the Systematics Community and the Ecological Community and the thing is, the Ecological Community could see a huge advantage to having people with more knowledge in Systematics and were able to help us understand better what we had at a particular place and so forth. The problem was that for the systematics community their interests were all at a completely different time scale. When you're interested in evolutionary time scales, what the diversity of a given place is and at a given time is a pretty uninteresting question and pretty much unpublishable within their literature. Very often you end up with a symmetry of where one group is going to benefit tremendously and the other group it's not quite clear what the benefits are because of the nature of the questions and that tends to be more of a problem there. I will say that in terms of our department, where a lot of it comes through is through the students. Whereas each of the faculty members came out of a disciplinary program somewhere each of the students is coming out of a multidisciplinary program and so, very often where you get the translation is when you're sitting in a dissertation defense and the student is giving a presentation and they're walking down the line with one foot on each side of it, providing their results and doing things that would have never been done in any one of the disciplines itself.

SPEAKER #2: What he said just sparked another thought in my mind which has been a dividing kind of thing and that is sort of, how you structure multi-disciplinary research proposals, for example, in the more classical science fields you have the hypothesis and how you're going to test the hypothesis, etc.? In engineering, very few people use that approach, they are more and more now. The first time I had one of my students with a natural resources professor on her committee when she made a presentation for her dissertation proposal and he said, "Where is your hypothesis?" "How can you have a proposal without a hypothesis?" Somebody else then said, "Well, this is applied engineering research and we don't have those sorts of things." We study the system and try to decide what it's telling us, but that brought a real appreciation for how to structure things. In fact, what collaborative proposals do, NSF for example, where they might be across two or three directorates, depending on who the principal investigator, who the leader is and how that write up is structured, we might actually send it to one directorate as opposed to the other so that they will look at it from that perspective rather than something else because those are some of the most challenging proposals to write, to get everybody's viewpoint into 20-30 pages is very, very tough. If you try to use all approaches and satisfy everybody

you'll never get there in the page limit. Having said that, one of the things that's very important, I think, is the sort of conversation we are having today. Having heard these other guys I feel like, Hey, I can collaborate with them!

SPEAKER #3: I feel like I can collaborate with you too. I like the way that you think. I'll offer two things, two things that are challenges. One is the definition piece. I've been to a number of good conferences where we sit and talk about definitions of tricky terms, for like full afternoons. The ones that I remember are the definition of Sustainability, Resilience and a two-day conference on the definition of Transdisciplinary. Fascinating for me to hear how different folks define these challenges and that it's important to achieve at least an agreement to disagree which is what I had with a number of my colleagues. We have great relationships together but we define these terms differently and it was important that we worked it out so we know what word we're using. A dictionary would be great if everyone would agree to it, but we're not there yet. The other is the real challenge of time scales that was mentioned. I'm an Economist, partly, and I work with climate change and economic scales, you know, is the human decision making scale really is quite different from the impact of what climate is going to be and so we've agreed to look at things in the small and the large and getting that right. I'm thinking about the Interdisciplinary Group, the UVA Bay Game that I've been involved with for several years was huge. It probably took three, two-hour meetings before we finally reached a compromise. We had to. As to what the scale of our efforts would be in defining the boundaries and the parameters on that and so times scales are absolutely huge, at least when you're talking money, because most of us can't really imagine what money returns will be after our lifetime is over.

FEMALE MODERATOR: That's one of the big challenges. Should we move?

MALE MODERATOR: Yeah, one of the things that I wanted to touch on, we've highlighted this a little bit, professional conferences whether or not, smaller conferences, regional conferences, team conferences, but we talked about that in terms of gaining an understanding of what the other side is thinking or how they're discussing ideas or whether or not we're coming to a shared understanding of concepts and terms. I was curious to know how reaching across the aisle, so to speak, at other institutions, so we talked a lot about collaborating with other institutions but do those personal relationships that you've highlighted of being able to walk down a building and passively come across something serendipitously or however you want to phrase it. Is it more of a challenge or less of a challenge or do you need these structured meetings to take place in order to be able to go across institutions as opposed to across disciplines? Or, is that just a byproduct of pre-existing relationships that you've had professionally in your life?

SPEAKER #1: I would definitely say that you definitely need to rub shoulders for a while. One of the most interesting collaborations I've had is with a group from Taiwan, the Taiwan Forestry Research Institute. What happened was that they sent a team of four people around to about six different LTER sites and asked the about how they were managing information and what they wanted to do was establish an information management system culture for their institution. What they actually then did was wrote a proposal that would basically send one of their people over to work with me for a period of three months at a time which is a very substantial commitment on their part and maybe less so on my part because I was still here and to tell you

the truth and I was able to leverage things so that I was sort of helping them to understand how to do something and they would help me do it. There was a little bit of a payback in terms of that. That has been sort of a long, on-going, very productive relationship that has been very helpful. It's been interesting because I used to teach them, sort of training sessions on how to do particular things and then they'd go over to Asia and now they're teaching all the Malaysians how to do it, there teaching the Filipinos, they're teaching the Thais. It has been really been remarkable to see. Now, a lot of that credit goes to the fact that they have that level of energy and commitment but the fact that I have had their people here for extended periods. I guess we had about five different 90-day periods when people were here and it means that we know a lot about each other so that when we meet we don't have to do much else; we're right back in working mode again. That is a very unusual situation when you can pull that off.

MALE MODERATOR: It almost sounds like it's a professional boot camp. Very condensed where you're building camaraderie so that when you leave you have the existing relationships that would probably have taken a much longer period of time to create and maintain if it wasn't such a condensed kind of event.

SPEAKER #1: Yes, I would say the biggest challenge is actually the one not running into people in the hall is that my perception as academics usually have their desks piled with about 10 times higher with things to do than you can actually do and sometimes running into somebody in the hall will sometimes move something up in the pile in a way that if you're waiting for an e-mail to go back and forth it just doesn't necessarily happen. It requires more initiation but you can run into the hall and somebody says, "How's it going on that paper we were working on", that it's your turn on, and then that does it there. We've had a lot of good and interesting collaborations as a result of that but I do think that things tend to languish maybe a little bit more between times when we do have a chance to get together or we have a specific deadline that we're working on.

SPEAKER #2: I've had another slightly different model with one group. We were all interested in lakes and we had one of our first conferences of International Water Association in 2009 and we met in Taiwan and so I got to know somebody in Taiwan and somebody in South Australia and we only meet each other at these conferences that are three or four years apart but because the conferences are very small and all single-session everybody gets to hear everyone else and we all get to eat together, vent together for three or four days, I'm getting ready to go to the next one down in Mountain Lake near Blacksburg starting Monday. In the meantime I've collaborated with the same folks on the climate change thing between us, Taiwan and South Australia. Trying to even get a radio meeting going with all three is tough because Australia is ten to thirteen hours behind us and so it's really difficult. E-mail is about it. When we needed to teach those folks about the models we use somebody came over and spent a week here with us, intense sessions and my students taught them the model and they went back and spread it out. Beyond that most of the collaboration has been through e-mail and the goodwill that was raised when we meet each other every three or four years. We kind of trust each other, we know, my motion sensor lights just went off [laughter] this is supposed to be friendly but it faces away from me so I have to sort of do this. You know you can pull those off if you know those people and like to work with them and enjoy them and the good thing is most all of us are pretty laid back, not a single true Type A person in that group because that's the kind of person that gets

very focused on one thing and impatient if you don't get an immediate response from the other side of the world and you have to understand it could take two days before you hear from somebody and those collaborations are interesting to pull off. They can be very rewarding because you get a different glimpse of culture and attitudes on how people view something simple like a lake or water changes between here, Taiwan and Asia and even in Australia.

SPEAKER #1: Talking about a difference in terminology, Wetland Restoration, which in the U.S. means taking something and converting it back to wetlands and in Asia means stowing wetlands and building agriculture or buildings on top of it.

SPEAKER #2: That's exactly right.

FEMALE MODERATOR: So I hear a lot of interpersonal relationships and how to develop that so, you have to like the person to-- I was reading Cialdini yesterday and you have to like the person to influence each other, right? I don't know if you know Cialdini.

MALE MODERATOR: I'm going to take this and just twist it a little bit because I'm hearing something that we haven't really thought about but I want to get your opinion on it. So, let's say your research is the magnet at the center of a polar opposite ends of the spectrum. It seems like in both situations of that we just talked about someone came to you either because of your experience or your expertise in the field. Do you find that in your experiences are you the receiver or are you going outward to acquire a collaboration. It seems that if you're bringing people to you because of your expertise that might be easier than having to go outward to find people to collaborate with. Do you get what I'm saying?

SPEAKER #3: The best experiences I've had its absolutely mutual where together we're having a beer and we come up with an idea together and we say, "Let's do that." Other than that, I'm frequently asked because of my economic expertise to work with other folks there and those are less fulfilling collaborations for me. I have to say I prefer to do it jointly to come up with the idea together. I'm usually asked, and I don't usually ask other people because I'm pretty busy with just the things that I'm doing.

SPEAKER #2: I'd like to echo that to a certain extent because, and it depends on how many years you've been at it and how much expertise you've gained. In my early years, my first tenures, of course, I was doing the asking and nowadays it's other people coming and asking and I'm getting to the point where I'm saying, Well, I'm sorry, I can't do that, I don't have the time. Earlier on, referred to scales and economics, one of the interesting collaborations we had, and it didn't pan out completely, but we worked on proposals with an economist, Faye Duchesne, she is retired now but she was up at RPI, and we approached her because she was well known on the economic side and here we were trying to address it on the engineering, very local side and so our time scale and our spatial scale were completely different. It took us about five to six months of going back and forth just reading each other's papers to understand what the other was talking about the future. When we talk about future changes we're talking 100-200 years, she was talking about a different thing and then spatial scale was a whole different story. A 500-600 square mile watershed, that's a big watershed, and she is looking at continents so how do you get those two to merge and how do you talk the same language. There was a real challenge but it

was a lot of fun once you got over the hurdles and it really expanded the amount of stuff I had to read and now I know a lot about stuff that I never thought I'd ever learn.

SPEAKER #1: Yeah, with respect to doing outreach, I do sort of a lot of outreach on a small scale. If I have a particular statistical issue there are certain people in the department I might go to ask them about or if there is something related to meteorology or climatology that's certainly an area where I'll be going over and talking with my colleagues, sort of in that area. Though it doesn't necessarily mean that we're co-authoring publications and that sort of thing, it's sort of helping each other out. I do a lot of that also for them and also a lot of the projects that I've gotten involved with have often been because somebody was doing something and they needed some expertise that I had in terms of geographical information systems or statistics or data manipulation or that was something where they needed me, needed help with. There have been times when I have reached out to-- one of the challenges we have with information management is that culturally we have had that chicken and egg problem. Nobody uses data that somebody else collected because they weren't trained that way. They were trained to use their own data and so, therefore, there was no data available so that even if you wanted to train somebody that way there wasn't anything for the to use. At this point with the LTR network we are publishing a lot of data and I've always been interested in trying to get it used more and also get it used with a better sort of tool set. Segments of our department tend to rely very heavily on Excel as an analytical tool which, it takes you, you get to a certain point where you're on a curve and you just hit a wall and you just can't go beyond that other than some really weird macro types of packages and things like that. I've been trying to work with groups to actually figure out how do we sit down and do a data synthesis project where we are bringing together large, diverse types of data and actually coming out with a product that will be something that the people who are information specialists alone couldn't do because they lack the domain knowledge and on the other hand it's things that the domain experts couldn't do because they lacked the information management skills in order to pull together really large or complex data sets or data sets that are tricky to match up. I have to say that I don't really think we've cracked the code on that. What usually tends to happen is its things like, a colleague of mine had a disappointing experience where they brought together a group of people and said, "We want to have a workshop in this area of science. What data sets would you need to have for that?" And so they then said what data sets they'd like and they spent a considerable amount of time discussing what the data structures needed to be and so forth and so on. A group went off for about six weeks and assembled all of the needed data and brought it together and then they brought together a workshop to actually do it and then they got to the workshop and the people said, "Oh, that isn't quite what we really want, hey, over there, can you give me your spreadsheet?" Very soon they were no longer using the published data sources. They were simply going back to the old, relatively familiar model of, you don't share your data in a publication way. What you do is, if somebody asks you for data you then craft the thing that they need and collaborate with them that way. Which is a fine model but doesn't really scale if you really want a large-scale synthesis going. I'm fond of saying, "We're really good at one data set. We're reasonable at two to three or maybe five data sets. Very few people work with ten data sets. Almost no one works with 100 data sets and nobody at all works with 1,000 data sets." At the same time, I see that as where a lot of the new and interesting science is going to lie is being able to integrate some of those things together. That tends to be one of those things where I'm always looking for an opportunity to figure out how can we bring people together in order to produce synthesis

products and actually make use of all of the data I'm spending so much trouble making sure is saved.

MALE MODERATOR: You know, anecdotally, it's just really funny for me because, in my previous employment I was the electronic records archivist for the Department of Energy and the EPA, and so what you're saying is, "I'm extraordinarily familiar with except I'm just on the back end of it." You call it the lifecycle of information. You have the first 50% of it is still in use and then the last 50% is in retirement but can still be used. So, what you're trying to talk about now by calling multiple data sets together is straddling both sides of the lifecycle. So that, not the generation part of it but going back to the end user side of it, and that's just interesting to hear because we have yet to hear things related to that kind of experience in terms of large data sets. We either have the people that created it, or it's no longer being used, and then researchers for their own personal reasons are going to look at it and try to figure new things out.

SPEAKER #1: I do think that we are making some progress on that just because of the fact that you are starting to have more diverse data sources out there. Journals are now requiring that data be deposited online as well. It means that, there are some types of things that you could never even conceive about doing because you knew that you could never get the data. I was seeing a quote the other day where somebody was saying, "Digital data lasts forever as long as you define forever as five years" [laughter].

MALE MODERATOR: That's true. We're talking about use of data now, so, it seems like a natural segue way into some of our other ideas. This one's a little more general. We want to talk about end-users. Now that can be specific to what research you're conducting. Whether or not it's policy makers or decision makers or funders that have funded your research or it could be something as broad as other researchers using your data or the general public or having a broader appeal to a larger audience and so in your experiences in the past or in terms of what you would want to see, have you ever collaborated with the quote, unquote, "end user" of your research?

SPEAKER #2: We tend to, almost all our research ends up where we have to go and explain to the end user and the end user will ask us questions because much of our research is funded by local governments. We're looking at the water supply or the streams that are flowing in the local area, monitoring those long-term and anybody who is in the southern part of Fairfax County is probably getting water from the Occoquan reservoir which we monitor and things like that so we end up in front of, not only utility boards, but also city council. The City of Manassas where I am has its own water supply, Lake Manassas, which we monitor and so I end up in a city council meeting once a year giving a summary of our findings. The amount of data we collect is enormous because we go out every week and we are continuously monitoring streams, but, when you have to condense it down to five to fifteen minutes at a level where city council elected folks can understand and feel good about, that is a real challenge and it really gives you an appreciation for where all the money, where, how you have to go and earn all that money, so to speak. I sometimes take our staff to some of those meetings and say, "Listen, you will keep saying what's going on with my data and this is where it's coming from and these are the people who are paying your salaries. Understand how this data has to be translated to their terms and that's part of my job." That's a real challenge sometimes, we work with metropolitan Washington council or governments, the level of science knowledge there is significantly higher

than, let's say, the city council meeting. Yet, having said that, Northern Virginia is a tough one because anybody who lives up here knows, it's got the highest fraction of PhD's in the nation and I've been to a public forum meeting where somebody was presenting a model for analysis in what they thought was a rural part of the county and somebody, the first question they were asked was, "Can you explain what your [inaudible] value analysis is of what the model did" and this guy would look like he'd been shot. He thought he was talking to a bunch of farmers and, it's like, whoa, where does that come from? So, your audience can be really varied in scale. There were farmers there but there were these guys who worked at MITRE and MITRETECH and government contractors up here so this is an interesting phenomenon. I had sort of a question that arose and I don't know if this is the appropriate time to ask it but I'll throw it in there and you guys can decide to introduce it. We talked earlier about, we mentioned, what the departmental and college focus might be on the rewards system but I'd be interested in knowing from my colleagues what their university's focus is. I've found that my university, Virginia Tech, now is really emphasizing collaborative, multi-disciplinary research to the point where our office of sponsored programs, the people who do all the paperwork and vet your budgets, have special teams put together to facilitate this. It has changed the value system overall in the university to the extent that, if you do one of these and you get a big grant your likelihood of getting a pat on the back or greater fame or something, be king on the website for a day improves, and that is changing the traditional you do this and you do that and how many papers to a certain extent. You end up with certain research collaborations that end up being in the news or whatever and certainly that brings back value to the university. The other two folks here are facing the same sorts of things in their university.

SPEAKER #1: I'm going to let someone else answer that one because I keep myself as far from university policies as possible [laughter]. Anyway?

SPEAKER #3: Yeah, I'm pretty much sick of all of those policies. I think that there is an elevated interest in interdisciplinary research, certainly folks are talking a good game and we have folks that are deliberately trying to encourage this. I've been to numerous dinners and conferences and so on, all designed to do that, particularly in the area of sustainability where I work most closely. I would be curious, so far that has not translated into tenured promotion which is really coin of the realm, the biggest gripe that a lot of us have up here for that. I'd be curious, yeah, I could get on the website for the day, and certainly we're tricked out to talk to alumni about our wonderful collaborative projects but is it really translating into tenured promotion down at Tech?

SPEAKER #2: Interesting. Not, not so much. The project I mentioned earlier on Botswana, a phase of that was done by this lady, she's the leader, not only that, she was on the NSF website home page for about a month or so, which I think was highlighted. Yet, when it came time for tenure they were like, "Well, you know, that's okay but it doesn't count for so much." "How much real money have you raised." She faced just a little bit of that, fortunately she got a couple of grants right before the PNT committee made a decision so she was through. For somebody with a lot of experience, she came to academia later in life so she had a lot of experience and to face this was interesting because she thought, hey, she gave a TED talk and stuff, not TED talk, the local one, whatever it's called, TED something, and it really amounted to not much when it came for that thing. When it came down to the PNT Committee it was like, how many papers,

how many dollars, etc. I'm a research faculty so I'm not on the tenure track so it's not if I can raise more money I have a job. When I go for a promotion it's come to the point where there not even interested in how many papers. It's how many dollars. That's what a research professor is supposed to do; raise money. I'm going, "Aren't we supposed to also write and perhaps write delectably?" "No, no, just go for this." It varies a little bit, it changes a bit when the PNT committees change, or when the Department Head changes, but at the end of the day you get the long-term message from the Provost and deans, the deans particularly, as to what's going to go ahead and there's no discounting the fact that there has been faculty here who had to leave because they didn't follow in those proper slots that people are looking for.

SPEAKER #1: I would suggest that some if it may be career phase specific because I'm loathe to advise a new assistant professor that's coming to the department to move away from the stuff you've been doing and start doing multidisciplinary stuff because it takes a certain amount of time to get ramped up with that. I'm much happier talking to an associate professor about it but the thing that I do think is interesting is that if you want to talk about that are the real heavy hitters, the people that are having a real impact, chaired professors and things like that, a lot of them have a vision and scope that is anything but stove piped. They are always looking out. They are always collaborating. The breadth of their knowledge is breathtaking. If you want to get tenure be focused. If you want to be a superstar spread out, is sort of my sense on it there. It would be nice if we could do the superstars right from the beginning. The ability to think broadly is all too rare and when you get somebody like that they can have a major impact. There are people that if I run into the hall I count myself lucky because I know I'm going to learn something new when I walk away from them there. Does that correspond to your experience?

SPEAKER #3: Absolutely, and there are colleagues, they're older than I am for sure, who really fit that bill that are fantastic, senior statesman in your department. I think that's the way that it is. We wouldn't advise new professors to do this, older, more experienced ones it seems to work out, that's a big deal. What's a little frustrating is that from the very top levels interdisciplinary collaborative research is definitely trumpeted, and in the decision-making process, which is typically from a department or from a school, we're still a little bit behind the times, we're still looking at rewarding disciplinary research when most of us would agree, I think, that the big problems are multidisciplinary in scope. So, the Academy is behind. We need to change that.

SPEAKER #1: Part of it also, I think is tenure boils down to something of a numbers game and we've talked about the time necessary to develop collaborations and that time comes away from something. You could be pounding away on your specific thing. Now the one thing that might be sort of an exception on that is sometimes you do actually get a faculty member who has a student who is multidisciplinary and that's somebody who is much better equipped to come in and continue what their training had taught them. So there is not that phase of spending so much time learning enough about the other disciplines and the way they think and the vocabulary that you can actually interoperate. There is also the challenge that when the tenure committee looks at the thing they don't care about how many co-authored publications you have, they want to see the ones where you were certainly the first author and often the only author as really the measure of your work. Obviously, collaborating with yourself is very useful but it's not nearly the same thing.

SPEAKER #3: Yeah, that is changing a little bit by school. Over the couple of decades I've been here, at one point in time it was very important to have sole-authored or lead-authored publications and currently I don't think we discount them at all if they're co-authored and I'm not sure if we give much of a jump for that. In fact, on our vitaes now, normally you'd list names, there would be Porter, comma, White, comma Smith, and Porter would be the lead author and nowadays I would list this on my resume as the title of the paper and the date, period, with Porter and Smith. It's changed, at least in my school. It's fascinating to me that we don't pay much attention to that and more on the co-authored stuff, which is good, I think.

FEMALE MODERATOR: To answer the question, I think Mason, also, we had a symposium and multi-disciplinary collaboration and I think they are also pushing that to happen. I don't know if anything has been changed in the tenure process which I think is a big drawback from, when you think about, especially new faculty, can I really afford to spend time on this right now even though I think it's really interesting because it's going to be taking time away from the publications and bringing in money and all the things that are top priority in the checklist of the tenure process thing so I don't know the answer to that.

MALE MODERATOR: It does seem to be at an institutional level getting pushed down and so the end-user component to this question is that if we're doing multi-disciplinary research across institutions or across disciplines is it at the university's request to make the end user aware of the research or is that a value that is inherent to the researcher themselves professionally or is it mandated by where they get their funding or what type of work it is? We can see this crossing over in different avenues and it seems like the self-promotion or the outreach efforts as to whether or not you're a website superstar is a mix of everything including the personalities involved in the project. Would that be a safe assumption?

SPEAKER #1: It has been interesting, the National Science Foundation recently revised their proposal guidelines to emphasize the need for that broader impact section. It's always been part of the NSF mandate, you're always evaluating proposals based on intellectual content and then also those broader impacts but it used to be the broader impacts didn't have to have their own section and now they do. With respect to the university, at least my perception is I'm not seeing a lot of that there. The general notion that the way you serve society is by publishing the best damn papers you can, finding out how the world works and the world can use that to go on and do their business without you trying to walk the process all the way through. With the long-term ecological research program we do certainly have some areas that definitely are outreach components, especially to K-12 education and that sort of thing. That's also within the context of a much larger research project that has that as an explicit mandate for what you're supposed to be doing. I think the engineering examples there are much better ones of walking it end to end.

FEMALE MODERATOR: They definitely focus more on the application and outreach vs. general. I don't want to say general research but, like, [inaudible]. Okay, so we've been talking a lot on broad questions, I kind of want to bring us to the end and that's a more direct question so if we're talking about how to engage in multi-disciplinary collaboration what are the advantages and disadvantages, the difficulties encountered to engage in these kinds of interactions. So, if there were an organization that wanted to help you with making these connections with collaborative research my first question is, "How would you feel about that?" The second

question is do you already utilize any other organization for that or do you just go forward by yourself?

SPEAKER #1: You've left us speechless [laughter]. I will throw in one example though I'm not really sure how generalizable this could be. Every three years the Long-Term Ecological Research Program has what they would refer to as an all-scientists meeting. Which is where you bring together 400-700 researchers from the different LTER projects together. Obviously, these are people who are interested in ecological research projects but the truth be told, it's highly multi-disciplinary and we've got everything from coral reefs to forests to practically lifeless valleys down in Antarctica. Where, as long as you don't get mauled by the nematode worms that are about the size of your hair you're completely safe from attack. This is not a meeting where people come with their paper and they present it and then the next person gets up and presents their paper and that sort of thing. It tends to be designed much more in terms of working groups. You might bring a group together and have one or two little talks to get it going and then it might be sitting around the room figuring out what opportunities do we have here, "What papers could we do?" That type of thing. That's a fairly effective way of doing that but that's also a fairly selected group and also there's a lot of resources to actually get people to the meetings. The biggest issue for me, with respect to meetings, is not that there are not lots of meetings out there that I would benefit from going to and I would like to go to but my time and resources for going to the meetings tend to be limited. In some sense, rather than having a group meeting specifically designed to do that what you might be better off doing is trying to help to foster co-meetings meetings of different groups. Sometimes you might have the Limnological Society meeting with the Ecological Society or with different groups there and then actually try to organize some symposia, some panel discussions or some outright working groups to focus on interdisciplinary research. That's just sort of a thought on that.

SPEAKER #3: It sounds like a good idea to me, as opposed to reinventing the wheel, because I think our time is limited. It's interesting that someone had remarked earlier that just doing multidisciplinary research takes a little bit more effort and that, of course, eats into the opportunity to go to other specific things like this. It would be nice if it was just and add on to an existing meeting that would at least be more interesting to go to a section on Climate Change, co-sponsored with the Ecological Society of America, at my normal finance meetings. I think that add-on would be pretty beneficial because I'm there anyway for other reasons.

MALE MODERATOR: So, we're sort of talking about not adding an additional time restriction or constraint on your finite level of availability. So, readjusting what is already there, and something that is physical in nature, face-to-face it sounds like as well. Has anyone had any experiences with any digital or on line type of information dissemination in terms of collaborative research?

SPEAKER #1: I'm afraid not. The experiences I've had are mostly within the LTR context in terms of working with people at other sites and things like that. Interestingly enough I've had some really strong, good collaborations that came, and this is sort of working within a micro scale or micro discipline, so to speak. I was working on this project where we were trying to create a controlled vocabulary for use with the LTR data systems and what we did was found some really accessible public software that was a really nice database for creating thesauruses or

thesauri. We came up with a list of terms. We sort of created the vocabulary but then we needed a way to make that useful and what happened was I took and tweaked the software a little bit to make it link up to sort of a search engine and then one of my colleagues who was really good at formatting meta data wrote something that would format the meta data into a nice, attractive report that you would get back once you've done the searching. We also wanted to integrate this with some of the existing data catalogs that we had developed at the network level and what we did there was we developed some web services so that if you asked for a term it would find all of the narrower terms underneath that. Then somebody from the network office was able to integrate that in.

What was nice was that I only had to work with the stuff that I understood, the person who did the formatting only had to work with the stuff that they understood, the person who was integrating the system in, I asked him what he'd like the web service to look like and he said, "I'd like it to look like that," and I said, "Okay, it looks like that," and boom, he's off to the races doing his business without me having to know exactly how he did any part of it. It sort of falls under the many hands make light work sort of thing and we did use video technology for some of that but it's also the sort of thing where if I have a question or problem I know that a lot of these people are on Skype and I'll just click on that and I'm off to contacting them. I've also had some very good and interesting experiences with doing things such as editing papers and figures. The week before last I was at a meeting and I needed to collaborate with a colleague of mine in Wisconsin about creating a presentation for that and we were here using Skype to connect us and we had Google Docs going and I'd be dragging one part of the figure over while she'd be working on the other part and it actually was very much like being in the same room with each other. It was not very different. When you make that larger and larger it gets more challenging as we sort of discussed earlier with the latency issue with the video. I'm not sure that was entirely responsive to your question [laughter]. I'll let some other folks jump in.

MALE MODERATOR: You know, I think what was mentioned is that an add-on to existing events is a good way to say it because with your Skype and Google Docs and live editing is sort of an add-on to an existing relationship or it's an enhancement to a collaboration that is on-going. What about in creating or finding or going outward to begin the research process. I've mentioned something in the past where, and I'll name drop something, Does anyone have any exposure to ResearchGate?

SPEAKER #1: Yeah.

MALE MODERATOR: Okay, so is that. Do you like something like that? Do you prefer something like that? Is it a waste of your time? Do you find it beneficial? Things along those lines. Is that something that's over there and, if needed, I can look it up but, otherwise, it's a nuisance?

SPEAKER #3: It's not a nuisance and it's over there. I'm not on any social media platforms like Twitter or Facebook or any of that sort of stuff except Linked In where I have disabled all push messages. But, ResearchGate, the push messages that I get from them are interesting because they will alert me to the publications of folks in my network that I may not have seen. Particularly, because I play with so many multidisciplinary colleagues, I'm not reading their

journals, so that actually is kind of nice and it's not overwhelming with the push messages. I might get one a week because it's really only when new stuff is published. So, that's actually helpful. It's not annoying. It's there, and, if I had to hunt things down I could.

SPEAKER #2: Yeah, my experience is about the same with ResearchGate and about the only other social media I belong to is Linked In with very limited access for other people.

SPEAKER #1: I have to confess I'm very shy to the social media type of stuff. I figure if people are on my website they know more about me than I necessarily want them to know. I do see that I've got an e-mail here that says that somebody and ten others have invited me to join ResearchGate. That's not something that I've used but that's largely because, again, I'm not on Facebook, I'm not on Linked In, I'm not on any of these types of things. Generally speaking when I'm out there looking for publications what I tend to be doing is more focused searching using Google Scholar which is probably my primary tool. Though, it means that I'm not necessarily keeping up with all the publications as they come out but when I'm after a paper I dig deeply at that point into the area that I'm interested in. It's darned near impossible to keep up, at least in my perception, with everything all the time.

FEMALE MODERATOR: I think it's interesting. We were talking about end users before and let me just disclose, I am on Twitter, on Facebook and I'm the opposite of y'all. Do you see any advantages?

SPEAKER #1: You're younger by the way. That pretty much defines the void.

FEMALE MODERATOR: Do you see advantages of maybe joining Twitter or Facebook as a way of outreach? Using it as an outreach tool so you can spread the word about your research and things you've been doing and maybe trying to. Because, again, ResearchGate is for researchers but I see Twitter and Facebook as a platform for everyone so if you want to do more outreach and public engagement with your science, Do you see advantages of that?

SPEAKER #3: Not as many as I see disadvantages.

FEMALE MODERATOR: What are the disadvantages? I'm just curious.

SPEAKER #3: Limited mind share. It's push versus pull sources of information and I'm not real fond of being pushed information. So, therefore, I wouldn't do it. Too much information overload. Why would I invite people into my house that I don't want to talk to?

SPEAKER #1: I had one very productive colleague, this is going back a ways, he would almost never answer e-mail or if he did it was very terse and his viewpoint was that he had a certain number of words that he could write each year and those could either be I peer-reviewed publications or they could be in e-mails. His decision was that words were precious and they went in to publications. So, it's a little bit of the distraction factor. Early on when I first started doing e-mail I was checking it every little bit and now I find there are times when I might actually on purpose just plain not look at e-mail for a couple of days because I really need to get something done and something like Twitter and Facebook tends to require more participation. I

will say that I'm actually on Google Plus but that's largely because we use it for their hangouts for doing video conferencing as a sort of free video conferencing. Some of my colleagues are quite active about posting things on it and others like me are completely inactive about posting things on it. Occasionally while I'm passing through there I might find something that I click on but part of the personal relationships tend to still be the driving way of doing the collaborations. I've very seldom had somebody say, Hey, We've never met but I saw your paper on such and such and I'd like to collaborate with you on a paper relating to X and Y. I don't think I've had that happen very often. There certainly have been times though when people have cold-called me about things but it tends to be fairly rare.

SPEAKER #2: I'm on Google Plus de facto because our university, about a year ago, changed over to Google Plus as their main supplier for e-mail and stuff. So, now all of those Google functions available, some of them are very useful, others are not. In terms of Facebook, right from the beginning of Facebook's era I had major concerns about privacy issues and the fact that they seem to change their policies on a dime. So, I don't trust them. Twitter? What message do I want to get across in 180 letters? I remember the time when there were line printers and that was the limit, 140 characters. To try to get the nuances of science or anything in that is just impossible. You could say, "Darwin was wrong," or something like that but what does that mean? That's just a sensationalist headline type thing. It's good for that. If I were to say, "I've just landed at Dulles Airport, hurray." All of my followers can get excited, that's fine for that. I don't see how it is helpful to me for scientific collaborations or whatever.

SPEAKER #1: That being said, I think if you interviewed our students they would say something completely different but there truly is a generational thing going on here.

MALE MODERATOR: The last question I wanted to ask really quickly. We talked about collaborative efforts as like a, every specific researcher has their own piece of the puzzle and then you bring it together for a larger product. If you had a diesel engine and you needed someone who handled diesel combustible parts in the engine but you had everyone else. You had the electronics person, you had the wheels and axle person but you needed to find that one piece of the puzzle, how do you acquire that individual? Is it all based on your personal relationships and people you've collaborated with in the past or is there a friend of a friend, the six degrees of Kevin Bacon separation kind of thing or is it a more focused search like we've talked about, whether or not it's on Google Scholar or reading journals or if you're receiving notifications from a pre-established set of principles and rules from ResearchGate. How would you want to find that expert?

SPEAKER #1: I would say usually it is that six degrees, and the truth be told, if you've got all the experts that understand the other parts of the diesel engine I promise you that there are people in that group that know people that know the part that you were missing there. That tends to be the way it's shaped out for me in the past. One of the things that's nice about the LTR network is, though it's not tightly connected, there are hundreds and hundreds of contacts out there so it's usually three degrees of Kevin Bacon. You don't have to get out to all six.

SPEAKER #2: I tend to agree. It's got to be somebody who knows somebody. The almost random type of scattershot approach of looking up somebody just based on their qualifications

and approaching them without getting some input from somebody else who is somewhat familiar with that person is risky. I've run into at least one or two occasions where some pre-eminent scholar in their field, you'd love to work with them based on their resume and you go and talk to the person and say, "Oh my God, I want to run far away from this person." God help you if you didn't actually find that out in the beginning. If you actually got into a proposal and a project and then you find this out, that's really a painful thing. I know this from example, because we did exactly this when we had a multi-university proposal. We approached somebody at another university who was the best known person in that field to be on our team, and there were a couple of other people from that university also, on the team. When it came time, and this is one of the difficulties of multi-disciplinary proposals, very often you don't have a large enough pot of money to spread across everybody. Secondly, not everybody has an appreciation for which part of the research costs more than the others. When I'm doing my Water Quality Model, that's cheap. One student with a computer. If I'm doing data collection in the field, that's expensive. How do you divide the budget? When it came time for this collaboration we had all agreed, we had made up the team and we didn't discuss the budget until it was too late and when we got to the budget he basically said, "I want 25%." Wait a minute. You're going to have one student and the rest of us, it was six or seven people, are going to have eight or nine students and we're going to be doing field work and all and you're going to be sitting at a computer and you want 25%? That almost broke up the collaboration right there. Somehow even his colleagues in the department kind of gave up their funds to keep the thing going but that left us a bad taste in the mouth and we had never even thought about collaborating with that person before. These are very critical problems that can put the kibosh on collaboration if you don't discuss them up front. If I'm working with someone we need to have some idea of what the research will cost and what they might expect from the thing. Again, especially when it's across universities, who are you answering to in some shape or form. The universities want to know how much money you got out of this. The department wants to know the fraction of the total that you got. Unfortunately, that driver is in conflict with the driver that makes you want to do that collaborative science. There is kind of a tension there.

SPEAKER #1: I was going to see if he was going to jump in there. I would say that one of the reasons you'd want to do it through the network is that there are some very highly respected scientists out there that you would not want to collaborate with on a bet because it's all about them. The one thing that I would say is absolutely key to a successful collaboration is mutual respect and sometimes when you get people at those lofty heights or perceived lofty heights, I would say more often than not, there isn't necessarily that mutual respect. When you're collaborating you really can't have it be master-servant. When I was taking Statistics many years ago somebody had a list of the different roles that a Statistician on a project could play and it was things like they could be the Priest anointing or they could be the servant, you know, go run this test or whatever. To be really successful what you want to be is in the collaborator role. Otherwise, it just doesn't work very well.

MALE MODERATOR: Good.

FEMALE MODERATOR: Do you want to close?

MALE MODERATOR: Sure. Go for it.

FEMALE MODERATOR: I'm surprised, this is the longest we've talked which is great. I have a question. Do you know who is funding this or what institution we were talking about?

SPEAKER #1: No.

FEMALE MODERATOR: Last time they had people Google me and they found out.

MALE MODERATOR: I guess they did the bread crumbs trail.

SPEAKER #1: Now we find out we've been talking to Facebook all along [laughter].

FEMALE MODERATOR: No, don't worry. Facebook is not involved. Twitter is not involved. The research we are doing is actually funded by Virginia Sea Grant and they are basically trying to put themselves in the position where, correct me if I'm saying wrong, they're basically trying to be the provider of more multi-disciplinary collaborations across their partner institutions and they're trying to figure out how they can better serve you in that role.

MALE MODERATOR: So, basically, in a very lofty goal summarizes, they want to be the point of contact that we've all been discussing. Your vetting interest, your friend that knows and has a working relationship with someone else that they can put you in contact with or even just a resource for getting your information out to the general public or the watermen in the fisheries or the aquaculture people that might be using the products of your research. So, it's a lofty idea. That's why we're asking the questions we're asking.

SPEAKER #1: One of the things that will be helpful is, when you were talking about how do you bring people together in meetings and things like that a critical aspect is the scope of it because if you're talking about trying to get, there is sort of a limited number of departments albeit multi-disciplinary within the different institutions that you're talking about as your target where it might be possible to actually bring some people together in a separate meeting in order to try to get some collaborations going in a way that would not be possible if you were trying to do that nationally.

FEMALE MODERATOR: Yeah, so I kind of want to ask this, because, I'm not, and don't hold me, I don't know if that's what they were thinking but I have a feeling that they were thinking that from this research we are doing they would be able to create a list serve or something on their website that would help multi-disciplinary collaboration but based on everything we've discussed here and the things we've heard on the other focus groups I feel that if they want to take that role they would have to have a more active role and not only putting everyone's name compiled in a list but have a more active role in creating those meetings or something like that. Is that a right reading or a right interpretation of what I'm getting or am I off on this?

SPEAKER #1: I don't see sort of another mailing list. My e-mail fills up with it now. They're sort of at the background noise level there. I would say also that it might not be the ideal place to start but focusing on social media I think you're going to have more success with the students

and that is an indirect way to worm your way up there but it is true that the proposals will be coming out of the professors not out of the students, per se.

FEMALE MODERATOR: I don't think they were thinking of social media. I think they were thinking of list serves and things like that. I like social media but I also have taken advantage of that for outreach specifically. Now, at least that you know the purpose of this, we didn't want to bias you in any way, now that you know the purpose of this is there any other recommendation or suggestions that you want to put out there?

SPEAKER #1: I guess I would suggest that if you want to look at what existing collaborations there were that might be able to be built on. It might be interesting to do a network analysis of the publications coming out of the different institutions. In other words, looking to see which people are co-authors, which people in which places. That probably would give you a very good feeling for who the critical individuals are to be giving talks. Here's somebody that does interact across institutions or across departments and that sort of thing. That's a thought on an analytical way to get at it and those might be the people to have as the panelists, giving talks at symposia or something like that to foster those types of interactions.

FEMALE MODERATOR: Would it have to be a symposium or something that formal because, at least in this group, beer was mentioned a lot of times.

SPEAKER #1: Yeah, well the big problem is. You can certainly get your institution to maybe pay some money to have you go to a meeting where you can give a talk but I've yet to be paid to go to a meeting where I didn't have to give a talk but there would be beer there and nothing but beer. Beer at 10:00 AM is a bad sign of the meeting [laughter].

SPEAKER #2: I think the suggestion is an excellent one because it really identifies those who are doing research in the area rather than by location or something. You'd think that, okay, if it's a sea type of thing that there is probably going to be an institution near there that does stuff but God help me, we, in my department have an Ocean Engineering program sitting up in Blacksburg. I guess they're waiting for the big tsunami there but they do go to the eastern shore to do research. One of my colleagues works with crab waste which, of course, is in the bay, so you'd never otherwise look up these people sitting up in Blacksburg to be in any shape or form be connected to anything with the Virginia Sea Grant. With their publications you might pick up on them.

SPEAKER #1: We'd be happy to hear that the LTER has at least one investigator from Virginia Tech and we also do our work on the eastern shore.

SPEAKER #2: We have a UVA guy who is a research associate and he has to disguise himself, I think. That old rivalry.

SPEAKER #1: There is the in-state rivalry going on for sure, but as long as it's kept on a good joking basis it's okay.

SPEAKER #2: We have our insignia on our t-shirts that they give us for the lab and we get to choose our colors and I have one with the UVA blue and it really confuses people [laughter].

SPEAKER #1: The guy who used to run one of the most popular restaurants over on the eastern shore used to be a big Virginia Tech fan and you took your life into your hands to go into that restaurant wearing a UVA cap.

MALE MODERATOR: I can only tangentially relate to whatever the in-state rivalry is because I'm a life-long Marylander so I hate Virginia equally so it's perfectly fine.

SPEAKER #1: We can all be united in despising North Carolina.

FEMALE MODERATOR: Okay, I guess we're at the end of our focus group. I would like to thank you all for taking the time and we know time is precious, we talked a lot about how time is important, especially in research, so, it really means a lot to us and we really appreciate the fact that you could take the time to talk to us. The discussion was great and all your suggestions so we really appreciate that.

MALE MODERATOR: And if there is anything you need you have my contact information. I will send out an e-mail in the next day or so and I'll provide Via's e-mail address as well so if there are any follow up questions or anything you'd like to know or if you're curious about where we go with this you'll have our contact info.

SPEAKER #2: I did have one question and maybe you answered it already. How did you find us? If that's a trade secret I don't need to know. That's fine.

MALE MODERATOR: Virginia Sea Grant went out and did a targeted search for faculty members whose research interests fell in line with a lot of their funding opportunities or areas of specialization or even future opportunities of where they might want to go. It was outside of our purview but we got a list of names from ODU, VCU, UVA, VT and George Mason with faculty members of interest. So, don't blame the messenger. I can deflect the blame with the best of them.

SPEAKER #2: I'm not blaming anyone. I actually enjoyed this conversation a lot and now I know, at least 1.5 faces because was keeping his hidden [laughter]. Now, when I'm in Charlottesville and I'm at Durty Nelly's eating something I'll ring you guys up.

SPEAKER #1: Obviously, somebody knows where the beer is in Charlottesville.

FEMALE MODERATOR: If you do end up collaborating let us know because it would be nice to know that we kind of helped connections to be formed. I think you'll be cool.

MALE MODERATOR: So, get out and enjoy this muggy day and we really appreciate it again and we'll be in touch.

//END