

University-Museum Partnerships: Reflections on Programmatic Best Practices for Sustainability Collaborations

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Abstract: In order to effectively address global sustainability challenges, a wide spectrum of society must be engaged. Universities generate knowledge, enhance understanding of sustainability problems and identify potential pathways to solutions. However, the information they produce often does not reach the public sector. Primary and secondary schools contain expert teachers and science communicators, but they are often limited by educational standards and other teaching duties. On the other hand, museums, such as science and natural history museums, are particularly skilled at translating scientific information so that it engages and excites the general public without the limiting expectations of school systems. Thus, partnerships between museums and universities offer great potential for disseminating sustainability knowledge and solutions on a global scale. However, given the complexity of sustainability problems, partnerships between universities and museums require a deep level of collaboration beyond the scope of information or resource exchange. In this article, we explore our experiences collaborating with museums, reflecting on challenges and, ultimately, identifying four main focal areas to successful, transformational collaborations. Though we focus on museum partnerships from the university perspective, we contend that any institution can apply these four steps to make progress on wicked problems that require immediate action.

Keywords: museums, science centers, collaborations, leadership, transformation

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Introduction and Rationale

Sustainability problems tend to be complex – or wicked – in nature (Lazarus, 2008; Rittel & Webber, 1973). They require interdisciplinary collaboration just to understand the nature of the problem, let alone formulate possible solutions. Given the layered, systemic characteristics associated with these challenges, sustainability researchers have called for casting an even broader net to conduct boundary work (Guston, 2001; Star & Griesemer, 1989). To accomplish this, sustainability science must include not only multiple disciplines (Kinzig, 2001) but also multiple sectors and the greater community at large (referred to within the post-normal science literature as an “extended peer review” (Frame & Brown, 2008)). In what follows, we outline why museum-university partnerships are beneficial, beyond their long history of collaboration (Boylan, 1999), and then detail what makes these partnerships particularly impactful for sustainability science. Additionally, we provide insight into our specific programmatic framing, which sees university-museum partnerships as a critical element in the boundary work necessary for sustainability (Clark et al., 2016).

The benefits of museum and university partnerships are bidirectional. Museums may benefit from additional access to cutting edge research, researchers and content experts to include in their exhibitions or to present at museum events, and/or eager undergraduate and graduate volunteers who bring fresh perspectives and human capital to support the museum’s efforts (Bell, Chesebrough, Cryan, & Koster, 2016). From the university perspective, museums can also provide a number of benefits. Engaging with museums provides universities with: capacity to extend learning and research through observation and access to museums’ collections (Kisiel, 2012), an audience to test research concepts, or engage a broader portion of the general public in relevant research topics through hands-on learning (Bell et al., 2016). In other instances, interacting with museums can help researchers refine public communication skills, extend the reach of academic research (Watermeyer, 2016), or act as training grounds through student internships or service learning opportunities (Salazar-Porzio, 2015).

Museums, in particular, are ideal focal points for creating sustainability change for a number of reasons. First, museums have an extensive reach. In the United States alone, museums welcome almost one billion visits annually with a reach that is greater than all of the domestic sports teams combined (American Alliance of Museums, n.d.). In terms of information culling, university scientists can filter and synthesize the plethora of information and identify cutting edge findings. In turn, the museums can disseminate the synthesized information in digestible and public-friendly ways. As highly-trusted centers for civic engagement, museums are the perfect place to discuss critical action- and problem-oriented topics that are at the heart of sustainability science. Finally, museums function as central hubs for public health, social work and change within families and communities (Camic & Chatterjee, 2013; L. H. Silverman, 2009). In this capacity, they are positioned to support society members that are most vulnerable, including those that are most impacted by the ill effects of climate change and environmental degradation inherent to sustainability problems. Ultimately, museums are positioned to educate, engage, support, and transform society (Cameron, 2012). Thus, bridging sustainability science research with science

centers and natural history museums is a natural fit. Universities are hubs for generating new information, but have historically struggled with getting their information out of the “ivory tower” and to the public – though they certainly have increased in awareness and effort in the past decade (see: Klein et al., 2011; Mathis, Hartline, Boehm, & Sheridan, 2016; Sugimoto, 2016). Fortunately, this is the area where museums flourish. As expert public communicators and educators, they are capable of drawing attention to sustainability challenges while supporting societal engagement in more sustainable decision making (Cameron, 2012).

Our Approach

As the world’s first school of sustainability, Arizona State University (ASU) is deeply dedicated to enhancing social and environmental sustainability and, as a result, fosters many initiatives geared toward co-creation in service of sustainability (Trencher, Yarime, McCormick, Doll, & Kraines, 2013). One such initiative, and the focus of this paper, is the Sustainability in Science Museums Program at ASU’s Walton Sustainability Solutions Initiatives. In addition to supporting university students’ educational experiences, the program is charged with supporting the dissemination and integration of sustainability science in informal educational environments with a focus on natural history museums and science centers internationally. There are three initiatives at the heart of this program. The first one is the Sustainability in Science Museums Fellowship which is a year-long fellowship for museum professionals that begins with a week long training and culminates with each fellow completing a unique, place-based sustainability project in their home institution. The second is the sustainABLE kits, a suite of activities intended to support sustainability learning and decision making which were designed in collaboration with museum professionals. The final initiative is customized workshops, ranging in topics from introductions to sustainability to creating long-term institutional change.

When we created the Sustainability in Science Museums Program, and subsequently launched its various initiatives in 2016, we identified examples of best practices in university and museum partnerships (see: Bell et al., 2016; Payne, Derenne, Zenner, & Crone, 2005; Rahm, 2006). Further, we visited more than 50 institutions over the course of a year and a half and attended several international museum conferences, meeting with hundreds of museum leaders internationally, to better understand the needs of the field. Certainly, museum and university partnerships are not uncommon nor undervalued (Bonacchi & Willcocks, 2016; F. Silverman & Bartley, 2013). However, despite the number of museum-university partnerships and publications on the subject, we struggled with the utility of the resources for this specific problem space.

To elaborate, since sustainability problems (and solutions) are unique, complex, and require interdisciplinary and broad-scale efforts, highly collaborative efforts are critical. Sustainability-focused museum-university partnerships, in particular, can extend and amplify the important role museums play in the propagation of, “boundary objects,” items that convey meaning while being flexible enough to engage diverse audiences in deep deliberation (Star & Griesemer, 1989). These collaborations begin with a space for dialogue in service of moving toward establishing a truly permeable boundary¹ between collaborating institutions. In this case, the goal is not to complete a set task or objective but to engage in deep “boundary work,” or the partnering of researchers with other communities (Clark et al., 2016), and continually collaborate to build and maintain momentum for long-term, far-reaching social change. Adapting from organizational

theory of transformational leadership (Asrar-ul-Haq & Kuchinke, 2016; Bass, 1985), we strive to move from transactional collaborations, in which each side “trades” in order to gain something from the partnership, to a transformational collaboration, in which the two sides come together to create a long-term relationship that, much like transdisciplinarity, creates something new from the partnership that neither side could create alone (Cardenas, 2015; Stokols, Hall, Taylor, & Moser, 2008).

Over the past year, we sought to plant the seeds for transformational collaborations through partnering with museums on five continents. Though there is much more to be learned, we have learned a lot. As such, we hope that this article services as a means to (1) share our insights from the university perspective and (2) open the door to more extensive dialogue on how we can work together to become more proficient at these transformational collaborations. In the remainder of this document, informed by regular and detailed feedback from our collaborators, we share what we found helpful and what has hindered our efforts with a focus on *how* to approach collaborations for sustainability education and engagement, rather than *what* to do. The purpose of such a focus is to compliment the significant work done on sustainability education models and best practices (see: Church & Skelton, 2010; Sipos, Battisti, & Grimm, 2008; Warren, Archambault, & Foley, 2014; Wiek, Withycombe, & Redman, 2011) Though we focus on sustainability, we posit that these facts hold true for any action- and change-oriented museum-university partnership.

Reflections and Best Practices

In what follows, we draw insights from a number of workshops that we led as well as other supporting activities that resulted from additional interactions with workshop participants (e.g., providing resources, engaging in brainstorming sessions, talking through organizational challenges, etc.). We hosted workshops, ranging from two hours to five days, serving as facilitators and experts on sustainability science and informal science education. Though there were other types of informal science educators in attendance at a number of our workshops, our programmatic focus targeted museum professionals from science centers and natural history museums. Their roles within museum varied, but many of the participants held professional roles in education, outreach, or public programs.

Before we outline some of our most critical learning from this past year, we concede that, in the process of writing in a concise and clear manner, subtleties and nuance can be lost. Thus we want to highlight two points:

- (1) We often reference the general experience of culture that we found within the museum and university settings and their respective organizational communities. Though we dichotomize the two cultures, we acknowledge and appreciate that a great deal of diversity exists within each of these settings.
- (2) In articulating what has worked for us, we also wish to acknowledge that we have had the opportunity to interact with individuals who have found great success at bridging the two worlds (museum and university). Though what follows are our insights, we would be remiss not to acknowledge the role they played in shaping our views.

Respect Knowledge Sets and Epistemologies

Extend an olive branch. When we launched our first program, we intentionally refrained from lecturing about museums. Though we have expertise in formal and informal education, we do not consider ourselves experts in the museum space. Therefore, in our first year leading our professional development workshop, we felt it would be disingenuous to extend our expertise past its true boundaries. We also felt it was important to demonstrate respect for the expertise of museum professionals and allow them to give voice to the field. Largely, this was well received, but it did leave a gap in the experience for some. Specifically, we neglected to consider how excluding explicit information generated from museum experts and scholars in the dialogue could be a disservice to the museums professionals in two ways. First, as passionate, dedicated museum professionals, talking about this problem space was exciting and important to our participants. Second, it did not provide space for participants to develop, or strengthen the practical application of sustainability within museum contexts. We remedied the lack of museum expertise in subsequent workshops in two ways. First, we shifted our content slightly to include our museum knowledge – incorporating our learnings and observations around museum interactions. We also provided opportunities for the participants to discuss their experiences and consider how sustainability resources might work in various museum settings. Second, we developed a process of incorporating alumni in the workshop programming, with alumni returning in a mentorship capacity for new cohorts of participants. Our first alumnus we included has significant experience with incorporating sustainability within his institution, so the participants could seek him out over the course of the training for practical advice. The alumnus fellow bridged the gap between our content expertise and practical application in a museum context, enhancing the relevance of content for our participants. An additional benefit of this approach is that it provided an opportunity to strengthen the relationship with our alumnus while giving him additional professional development.

Wield expertise carefully. Cross-sector collaborations yield interesting results because of the combination of two areas of expertise and the unique feedback and insights that can be gained from someone outside of the sector. However, there is vulnerability in trusting someone as expert. Knowing where the limitations of each person's subject matter expertise is critical to create space for other people to contribute. This trust is necessary for true interdisciplinarity to occur (Pittman, Tiessen, & Montaña, 2016). During initial interactions with a potential partner, it is imperative that each side can clearly articulate their area of expertise while hopefully being aware of their limitations as well. As the collaboration continues, regular communication should be maintained so each collaborator's role is understood and there is no duplication of efforts. Additionally, this iterative process serves as a consistent mean for calibration. Interdisciplinarity is difficult and collaborators should not be expected to fully understand each other's formal and tacit knowledge at the initial meeting, no matter how clear they may be. Once knowledge sets understood, collaborators must then navigate the process of bringing the areas of expertise together.

For example, we collaborated with a group of museum professionals to develop the sustainABLE kits, hands-on activities to engage visitors on the public floor of museums. The museum experts came with a significant level of experience in creating these activities that effectively engage museum visitors in interactive ways. Thus, our museum partners functioned as experts in the design and delivery of museums activities, and we served as content experts in sustainability.

While creating one particular activity, the different focuses associated with the each of the two areas of expertise created conflict. The sustainability scientists were focused on ensuring the complexity of the scientific construct was not lost, whereas the museum partners were focused on ensuring learning objectives were clear and obtainable. Though we were temporarily at an impasse, by being respectful of each other's areas of expertise, maintaining open minds, and sticking with the problem, the group eventually found a resolution. Though our working group considered tabling the activity, we persisted and eventually developed a product that met both sets of goals (those of the museums experts and those of the sustainability content experts). Interestingly, the resulting game has been the most well-received of all the kit activities. The tension between the goals of science museum educators and the goals of sustainability scientists drove the working group to be more critical and intentional in how the game was shaped so that both set of goals could be met. This was only possible because both groups of collaborators listened and took into consideration each other's unique expertise, while also standing up for their own area of expertise to ensure their voices were heard. Good collaboration across fields is challenging and requires a careful balance of respecting those boundaries while also being able to critique ideas and work through areas of difference in a productive way, even if they are outside the bounds of participants' comfort zones.

Understand and accommodate institutional cultural variations in engagement styles.

Though museum professionals and academics share an investment in learning and education, we found the two groups have different ways of engaging with materials that interest them. In designing programming, we did seek to include different modes of learning through incorporating visual, kinetic, written and spoken elements as well as group discussion and quiet reflection. However, we failed to consider the strength of cultural norms in learning preferences. After our first workshop, we quickly became attuned to this difference.

For example, through our evaluations, we learned that museum professionals often stated a preference and desire for kinesthetic (or whole body) learning activities and concrete application examples, whereas, academic discussions in which we've participated often center around abstract or theoretical constructs and participation through critique. Both means of engagement are valid and enhance learning in different ways, so we opted not to remove one method in favor of the other and, instead, layer methods as much as possible. Figure one demonstrates how we sought to incorporate more visual examples and layer discussion-based activities with opportunities for kinesthetic means of engagement alongside verbal and pictorial (not pictured). However, it is valuable to be mindful of how and when each approach is used and acknowledge differences in preferred engagement and learning styles of the group. Though most participants will be familiar with the construct of learning styles, articulating how it functions in this particular setting allows them to be more aware and intentional about how they participate.



Figure 1. Though we included activities and visual aids throughout the workshop, we found that museum professionals preferred a higher level of visual and kinesthetic engagement than are common in more traditional academic environments.

Stoke a fire, don't fill a gas tank. It is often easiest, when faced with a new interaction, for an individual to think about (a) what the other collaborator needs to learn (from the individual) or (b) how to “plug” them into said individual's existing work. The latter case can appear condescending and the former can result in treating others as a resource to be extracted. As with most other type of resource extraction, it will soon run out. Instead, we found that fueling the fire – through generating energy, asking questions, being open and patient, and providing ample time – has allowed for richer, more sustained – and often unexpected - outcomes that fostered long-term collaboration.

Our first alumni mentor is a great example of an unexpected long-term collaborator. Upon meeting him and learning about the extent of his sustainability efforts at his own museum, we initially were inclined to deem him “over qualified” and reject him from our pool of applicants for our first workshop. However, after some thought, we opted to invite him to attend with the caveat that some of the content might be too introductory for him. He, ultimately, wound up being a strong addition to the workshop with many of his peers turning to him for informal support. Though he did not fit our initial criteria for an ideal applicant and we perhaps did not meet his criteria for an ideal workshop, having more flexible ideas around interactions benefitted the workshop cohort and laid the foundation for a very fruitful, long-term collaboration. In other words, by transitioning the focus from ‘filling’ them with information to ‘fueling’ an open discourse around sustainability in science museums, we were able to better pivot content and ideas for mutual benefit.

Create Clarity without Over-Engineering the Process

Interdisciplinary and cross-sector collaborations are challenging. The challenges are, in part, due to the epistemic differences and the different objectives of the institutions. Those seeking to collaborate can sometimes experience stress as they work to navigate how to define the relationship and effectively work together. When witnessing people who exhibit signs of stress, the natural response is to shrink the task or halt the collaboration. However, a moderate level of group stress is an important part of the process and offers a number of benefits including more creative, innovative outputs (Che, Qi, Guan, Zhang, & Yang, 2014; Troyer, 2009). Further, shrinking the task or creating too many boundaries limits the dialogues that people will have and may, in turn, limit the scope of opportunities for exploratory conversations. These exploratory,

Ultimately, the goal is to support participants in deciding whether or not they would like to collaborate, even if they are not yet able to articulate what collaboration might look like.

Anticipate and Accept Challenges and Delays

Transformation takes time. Transformational collaborations, like any other transformational interaction, require time and flexibility. The trust that it takes to have open, genuine dialogue can be hard won. Further, navigating the collaborative space once the individuals do begin to work together can take time. As facilitators, we found two actions that, when taken, supported collaboration: (1) practice patience and (2) provide information and problems to which the group can respond.

Initially, we were quite cognizant about creating space to build trust and present problems for the group to consider. However, we grossly underestimated the time it would take for groups to work through problems. This resulted in participants not receiving the full benefit of the programming as well as experiencing stress. In subsequent trainings, we increased the length of the training significantly to accommodate for the time needed to build trust and work through problems. Further, we invited other experts to assist with the brainstorming process, which provided differing perspectives and diverse content expertise. This aided in two ways: (1) the experts were able to bring new perspectives, which allowed the participants to see problems differently and supported new insights, and (2) they provided additional leadership in groups, which eased tensions for the workshop participants.

There are institutional constraints. Throughout our reflections, we reiterated in a number of ways that time and space is needed for these interactions to occur. To ensure effective interactions, there must also be institutional support. Although we recruited very motivated museum partners, when they returned to their institutions after the workshop, many experienced institutional barriers beyond their control. Despite our efforts to reach out, we repeatedly saw a lack of progress. Through additional discussion, we eventually realized that, though the collaborative element aligned with their values, they did not have the institutional capacity. “Capacity” often related to staff time, financial resources, or leadership support. With these collaborative efforts there is a need to distinguish the difference between good intentions and actual human resource availability. In cases where museums lack resources or capacity, we choose to check in regularly and leave the lines of communication open, but ultimately leave the ball in the other institution’s court. Many of these institutional hurdles can be avoided early in the collaborative process by ensuring proper leadership buy-in.

Support Camaraderie and Partnerships

Garner leadership support early. One step to increase the likelihood of success in university-museum collaborations is to garner leadership support on both sides of the partnership. Although leadership buy-in alone will not ensure collaborations will be effective, they are critical gatekeepers to securing the time, resources and space that potential collaborators need to be successful.

To address leadership buy-in, we required all participants to submit a letter of support from their supervisor. Although this letter of support was useful to ensure the participant was available to attend the workshop training, it did not ensure continued support to develop the collaboration

over time. Further, though their supervisors supported their efforts in theory, the majority of the participants ‘wear many hats’ and some occasionally found it difficult to fit their sustainability project into the daily demands of their jobs.

The most successful university-museum collaborations we have witnessed involve a high level of organizational buy-in from both parties. For example, one of our collaborators already included sustainability in many aspects of their organization’s operations prior to attending our workshop. However, as the collaboration grew, we saw the museum take on a greater commitment to sustainability by embedding the concept in their mission and vision. Further, they credited our university-museum collaboration for helping solidify their leadership’s belief in the value of sustainability within their organization. Further, they felt participation in our workshop helped to amplify this organization’s prominence as an exemplar of sustainability in science centers through regular inclusion as a best practice at international conferences.

Leave space for contribution. Despite our focus on the differences that exist between museums and universities, both groups share a love and investment in learning and curiosity. Though many people may initially interact without finding a specific need for collaborating together, through ongoing discussion, they may discover areas of shared interest. Further, if there is a sense of a cordial working relationship within the group, more opportunities to collaborate may arise over time. As such, we include visual reminders to encourage collaborators to maintain open minds when hearing new ideas (see figure 3).

Similarly, when collaborators reach out with an idea, anticipated roles of each collaborator should be outlined and perceived outcomes of the relationship should be discussed. Ensure the request includes space for the other person to negotiate roles and outcomes or, in other words, respect each other’s area of expertise and autonomy. For example, museums have approached us to fill a very specific role which did not align with our areas of expertise or the theoretical framework of sustainability from which we work. One museum asked us to audit their organization for sustainability operations. Although our university does include faculty with that expertise, organization operations is outside of the scope of our current work. In response, we redirected the conversation toward constructing a big picture objective and then proposing a new role that we could play. Fortunately, we had a pre-existing relationship with this museum partner that left space for open dialogue. Through continued discussion, we were able to articulate our expertise and the collaboration was ultimately redirected in way that was appropriate for both parties. Had we not already built strong rapport, we may have disengaged because of poor fit.

Reach out without needing anything. Checking in regularly continues to foster the relationship that both sides have worked so hard to build. Further, regular check-ins allow more opportunity for sharing challenges, ideas, and current projects, which may result in offering support or opening the doors for further partnering. There are a number of ways to engage in communication – each with their strengths and weaknesses.



Figure 3. This poster of “Brainstorming Rules” includes suggestions to “ask clarifying questions” and to refrain from censoring or judging ideas in their early stages.

For example, email is particularly convenient when dealing with a partner who is in a different time zone or works a different schedule. However, it can lead to miscommunication or misinterpretation of tone. We have found that real time communication (in-person, phone, video conference, or simply text messaging) is more fruitful and ultimately more time efficient in the long run. To maintain the relationships with our workshop participants, we regularly try to find venues to support further in-person and digital interactions. For example, we created a social media page where participants can post articles or pictures. We also organized a meeting at the Association of Science-Technology Centers conference so alumni could reconnect and discuss sustainability challenges and successes they experienced in the past year. We plan to make this an annual event to ensure our growing network of alumni are able to network, share resources and continue to develop their relationships for future collaborations.

Conclusion

Through the creation of workshops and hands-on activities, we have developed a network of over ninety museums and centers that are incorporating sustainability science within their organizations. Through our experiences with our three initiatives combined with program evaluation and collaborator feedback, we identified four high-level best practices to further the effectiveness and depth of collaborations. Below we reiterate these best practices which are perhaps more aptly described as philosophical underpinnings to our collaborative approach. Be that as it may, alongside each of the four suggestions we provide examples of simple activities or processes that set the tone for such interactions.

1. Respect knowledge sets and epistemologies – This best practice is challenging in that, in order for collaborators to respect each other's expertise, they must first have some insight into what each other's knowledge sets and epistemologies are. During early interactions, it can be challenging to know how various areas of expertise differ or align and where the boundaries of expertise lie. Collaborating without that knowledge requires a higher level of trust than one can expect early in interactions. What follows is one example of enhancing understanding of expertise early on

After introductions, begin the first meeting with an icebreaker between the two institutions. Though icebreakers are often associated with introductions and teambuilding, in this context they are used to surface assumptions that may hinder deeper group work. In pairs composed of one person from each institution, each person should take on the role of the other person (e.g., the museum professional plays the university professional and vice versa). Then, each person takes a turn describing his or her area of expertise to the other person. Once both people finish introductions, they take turns explaining to each other what was correct and what was missing in their representation. Through creating a relaxed – and even playful – atmosphere, people can begin to articulate the bounds of their knowledge in a fun and engaging way.

2. Create clarity without over-engineering the process – This is one of the more challenging steps, as it often involves being aware of the group dynamic. An important starting point to accomplishing clarity is by focusing on process over content when structuring meetings or workshops. By providing a broad content area, rather than a specific one, there is more room for collaborator contribution, which lessens the likelihood of

inadvertently anchoring the group. Additionally, having a well-structured process flow is useful for keeping the group from getting “stuck.”

3. Anticipate and accept challenges and delays – A simple step that can be taken is to provide ample opportunity for collaborators to regularly and *productively* vocalize concerns. Productive vocalization of concerns involves discussing steps they could take to lessen the chance of the concern becoming reality and actions to take if concerns do become reality. Through surfacing concerns and developing actionable steps together, doubts become an opportunity for “planning for surprises” and further teamwork.
4. Support camaraderie and partnership – Though we previously identified the concrete task of acquiring leadership/supervisor support, there are other actions that can be taken to enhance the cohesiveness of collaboration. Broadly speaking, incorporating icebreaker activities at each meeting – such as the one identified in best practice one – allows collaborators start to interact in more informal ways, which can be helpful in fostering group cohesion. A more targeted effort at supporting camaraderie and collaboration might involve proposing a team vision and then having the team edit and modify the vision to better reflect their hopes.

Though these four best practices can be valuable, they are in service of a broader objective. We, ultimately, are advocating for a concept that is well known within the organizational change literature: “going slow to go fast.” Through not rushing through earlier, easier elements of collaboration, the group is more prepared to work through challenges that occur later. We discovered that what undergirds successful collaborations, in moving from transactional to transformational interactions, is fostering openness. This openness includes sharing ideas, receiving ideas from others, allowing thoughts and expectations to transform, nurturing openness in others, and ultimately results in creating a new “team” that spans across organizational boundaries.



Figure 4. Our first cohort of workshop participants and sustainability collaborators who have continued to work together since the completion of the initial one-week workshop. They share resources, generate ideas together, visit each other's institutions, and co-present at conferences.

The success of collaborations ultimately lie in the hands of all collaborators, but facilitators can create a culture of openness that allows space for people to understand and explore without rushing to judgment or decision making. Our observations suggest that developing this environment requires a steady hand, presence, and willingness to shift gears as facilitators. There appears to be a “just right” balance for these interactions to be successful. For example, structure is critical to maintaining momentum, but in certain group dynamics, a perception of too much structure may result in stifling the group. However, other groups may have the same amount of structure and perceive it as too ambiguous to a point that it creates anxiety, requiring additional structure to be employed to keep conversation and collaboration progressing in a meaningful way. Thus, the facilitator must be experienced and flexible to adjust quickly to best meet the needs of the group.

One challenge associated with these observations that is important to acknowledge, is that – though there are concrete steps that can be taken, such as seeking out a conversation without a specific purpose or need – these suggestions are more closely tied to soft skills associated with being open to discussion, and comfortable with ambiguity. At times, these skills can appear innate or be associated with certain personality types, however, they are not immutable and can be strengthened (Specht, Egloff, & Schmukle, 2011).

In conclusion, what we find in the space of transformational, transdisciplinary sustainability collaborations are that there are numerous moving parts, with differing interests, ideas, expertise, and expectations. This makes a ‘one size fits all’ model inappropriate for advancing the understanding and goals of such a diverse set of individuals. However, if we are to extend the importance of transitioning to a more sustainable world, we must rise to the challenge. This requires the necessary sustainability knowledge that must be imparted and an understanding of emergent organizational dynamics of diverse teams (diverse in culture and the formal and informal knowledge they have acquired through their training and lived experiences). These best practices function as heuristics for developing collaborations. Through strengthening the quality

of collaborations, individuals will be better able to learn from each other and communicate sustainability science and actions to a broad, diverse public.

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ⁱ The “permeable boundary” referred to here is a nod to both the “boundaryless organizations” of Jack Welch (see Ashkenas, Ulrich, Jick, and Kerr, 1995) as well as the “boundary organizations” of David Guston (see Guston, 2001).

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