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It Takes a Village to Raise a Science Communicator

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Abstract

Using the metaphor of a medieval village, I share and reflect on my story as a PhD student, holder of an underrepresented identity in STEM, and next-generation boundary spanner in science communication. I am a science communicator to faith-based communities—a neglected and often contentious space in science communication. Through 6 years of graduate education, my metaphorical village helped me to discover and refine my "impact identity," the fusion of my outreach with my scholarship that enables me to advance into the next stage of my career with community engagement as one of my strongest assets. Beyond my personal story, I reflect on what a "village" can look like for other boundary spanners. My village concept can help students, universities, and others in higher education navigate the development of next-generation boundary spanners in science communication.

Keywords: science communication, graduate student development, faith-based communities, underrepresented students, boundary spanning

Our world is undergoing massive challenges that can bring societies together or split them apart. In the face of climate change, polarizing perspectives have emerged as some communities emphasize the urgency of collective action while others resist due to conflicting interests or skepticism (Falkenberg et al., 2022). Facing environmental injustice, marginalized communities have had to bear the disproportionate burden of ecological crises while affluent communities remain relatively less affected, exacerbating existing disparities and deepening social inequalities across various scales (Faist, 2018; Folke et al., 2021). As nations unite on sustainable development (UN General Assembly, 2015), conflicting priorities among societies reveal tensions in balancing socioeconomic progress with ecological responsibilities (Díaz et al., 2019; Menton et al., 2020). And as new technologies develop at incredible speeds, some members of the public are encouraged and empowered while others are at risk (Leach et al., 2010). While these and other such delicate tensions arise, barriers between the academy and society are becoming noticeably and intentionally thinner, reflecting efforts to assist, inform, and develop trust in finding solutions for our shared future. Specifically, sharing one's personal identity has the power to shift perceptions and ease tensions in important conflicts (Chu et al., 2021; Scheitle & Ecklund, 2017). Thus, to span new boundaries in outreach and engagement, the next generation of science communicators must dare to get personal.

I am a PhD student, an ecologist, a woman of color, and a Christian. Starting my PhD during a time of social injustice, environmental injustice, climate change, a global biodiversity crisis, and a global pandemic, I witnessed the "perfect storm" for the world to also experience a crisis of faith. In response, I emerged as a science communicator to Christian communities. However, this emergence was not easy. Faith-based communities are strongly linked to polarization on public health and environmental issues (Corcoran et al., 2021; Lowe et al., 2022; Perry, 2022; Rutjens et al., 2022). They are also among the top neglected spaces in science communication, alongside communities of color and the LGBTQ+ community (O'Malley et al., 2021; Wilkinson, 2021). Long-standing controversies and public debates over science and faith have built distrust and strong societal barriers between these two spaces (Curry, 2009; de

Felipe & Jeeves, 2017; O'Brien & Noy, 2015). Additionally, the stigmatization of religion within scientific and academic settings has led some 40% of religious graduate students in the sciences to conceal their faith as they struggle with balancing their scientific and religious identities at school (Scheitle & Dabbs, 2021). Given these tensions within both broader society and the academy, I recognize that my ability to share my faith as both a student and an emerging public figure in science is a rare privilege (Scheitle, 2023, 2024). I am also aware of the inherent challenges this endeavor holds for my career (Edwards, 2015). As I dare to harness my faith-based identity to reach out to underserved communities that are not the "norm" for others in my field, my professional development journey as a science communicator has required more than the university as my source of support. Considering my community and borrowing from a famous African proverb, I realize that "it took a village" to raise me into a science communicator.

In an era of diversity, equity, inclusion, and belonging, universities have the potential to host a variety of boundary spanners who will become crucial for our changing world. Boundary spanners are bridge builders between institutions and external communities who engage in unique behaviors as they play important roles in translating and integrating diverse perspectives, building and maintaining trust, facilitating communication and understanding, and creating a shared vision toward mutual goals (Peterman et al., 2021; Sandmann et al., 2014; Weerts & Sandmann, 2010). Here, I share and reflect on my personal experience as a next-generation boundary spanner and graduate student. I use the metaphor of a village to identify the many actors and components both within and beyond the university that contributed to my development as a science communicator in an atypical space, focusing on the medieval version of a village due to its centering around an ideology instead of an academic institution. I share how this medieval village concept can apply to other boundary spanners in science communication and potentially other areas of outreach and engagement.

A Science Communicator's Village

A medieval village is a suitable metaphor for my (and hopefully others') experiences as a next-generation boundary spanner in science communication for three main reasons. First, it decentralizes my main institution (the university) and invites another group or institution to become a central place of identity, belonging, value, and understanding. In medieval times, this central place was the cathedral or church, which had an overarching, structured influence on local communities (Slater & Rosser, 1998). Second, the hierarchical structure of medieval societies allows me to summarize and characterize multiple people, groups, resources, and organizations into understandable roles. My metaphorical medieval village consists of two institutions and 10 types of actors that have been integral to my development as a next-generation boundary spanner in science communication. In this village, I position myself as a fellow villager. I am a student or apprentice, and thus of low status. Seeing myself as a fellow villager allows me to acknowledge the hierarchical structures around me (the metaphorical parents, elders, institutions, etc.) while putting myself in a position of humility and resourcefulness, since given my current career stage I do not have access to the same privileges (finances, tools, personnel) as higher level academics, established science communicators, or other professionals. Lastly, roles within medieval villages have widely recognized names and are universally relatable, as they permeate fantasy literature, movies, games, and popular culture (Cook, 2019; Tolmie, 2006; Young, 2015). It is my hope that contextualizing my story in such a way can help others to easily associate my descriptions with their own experiences or development needs. Table 1 summarizes these roles, with examples and questions for personal reflection.

The Village Cathedral

At the center of a typical medieval village square is a cathedral or a church. It is a village's most important building, representing a foundational ideology that shapes the village community (Slater & Rosser, 1998) and serves as a self-governing body that liaises between lords and other authorities to maintain harmony (Dyer, 1994). For a science communicator, the cathedral represents a central place where community members gather to affirm their shared values. It can be an organization or group with a common cause or shared identity that is part of one's platform as a science communicator. A cathedral can help develop, hold, and maintain a science communicator's foundation as they

Table 1. Medieval Village Roles That Serve as Metaphors, With Examples and Reflection Questions

Village role	Examples	Questions for personal reflection
Cathedral		
A central place where members of the boundary spanner's community gather to affirm their shared values or identity.	Church; nonprofit organization; company	What are your core values? How do your core values intersect with your scholarship? Which groups or organizations outside your institution best represent and uphold these values? Do they have a mission or core values statement that you can adopt?
School		
The institution where science communicators are trained, conduct research, teach, publish, and fulfill other scholarly activities.	University; school; educational program	What programs, workshops, or courses at your institution are accessible to you that would be helpful for your training and development as a science communicator?
Parents		
Mentors for personal growth and development who support the science communicator in areas beyond values, mission, alliances, and scholarship, since those may shift over time.	High school teacher; neighbor; family member; community elder	Who has been alongside your personal journey as you have pursued your goals and profession and redefined your values, mission, and vocation? Have you taken time to express gratitude for them? Would it be helpful for you to reconnect?
Elders		
Well-experienced, earlier generation of science communicators who hold a close overlap with the emerging science communicator's calling and mission.	YouTubers; public scientists; government officials; TV hosts	Which science communicators do you follow on social media? What kinds of posts go viral? How do they publicly handle adversity? How do they answer difficult, or even controversial questions? Have you met those closest to your own mission and values? If you could meet them, what advice would you seek?
Kin		
Peer-level sources for encouragement and vulnerability, helping to ensure the longevity and sustainability of the science communicator's mission.	Friends; lab members; fellow students; fellow researchers	Do you share your outreach and engagement endeavors with your close friends? Do you have someone with whom you can share your good, bad, or confusing experiences in confidence?
Children		
Others with less experience who are inspired by the science communicator and seek formal/informal mentorship and connection in a shared value or scholarship.	Undergraduate students; audience attendees	Have you had the opportunity to serve younger generations? In what ways? When privately mentoring, have you tried generalizing stories and experiences, as a way to practice sharing public versions of your stories with larger audiences?
Guards		
People or groups to consult when evaluating and redefining professional boundaries and the extent of one's reach as a science communicator.	Outreach and engagement office; personal counselor	When invited to participate in a new activity, how much does that activity intersect with your core values and mission as a science communicator? How much time would you need to commit to that activity? If not relevant or no time, who else's voice could you amplify by suggesting them instead?

Table continued on next page

Table 1. Continued

Village role	Examples	Questions for personal reflection
Tradespeople		
Experts who are not always present in the science communicator's journey but are available to help solve complex, topic-related problems or provide new resources (e.g., skills, technology, or materials).	Theologians; climatologists; organizational leaders; subject professors; peers; journalists; librarians	Who have you met at professional conferences or outreach events that can watch a practice talk or read a draft blog for you? Who can comment on your practice responses for an upcoming interview? What kinds of material resources can enhance your science communication skills and reach? What does your school offer? What does your village cathedral offer?
Wealthy patrons		
A means of financial support that is specifically targeted for a science communicator's outreach and engagement activities.	Scholarship programs; grants; broader impacts statement and budget; community partners	How much do your science communication activities financially cost you personally? If you are a student, is there support through your lab, department, or student government?
Town crier		
Someone who calls special attention to the science communicator's engagement activities, scholarly work, and professional achievements.	Communications director; social media influencers; email discussion lists	Who shares your news? Who helps to celebrate you in the midst of your work? Which social media groups follow you that you can privately message and ask to repost or highlight your posts?
Jester		
A person or group that holds opposing or challenging views about the science communicator's outreach endeavors; can be a "critical friend."	Skeptic; audience member; YouTuber; critical friend	How do you react to criticism about the things that matter most to you? How do you react to criticism about your central message as a science communicator? Are you familiar with the arguments? Do you have someone with whom you can safely discuss opposing perspectives?
Mayor		
An overseer of the science communicator's activities, who makes sure that scholarly guidelines, principles, expectations, and priorities are upheld.	Advisor; boss; supervisor	What are the general conditions that cause you to fall behind in your scholarship? In what ways can you create a healthy balance between your outreach and scholarship to ensure that you achieve the primary goals of your main institution (i.e., your village school)?

Note. These roles serve as metaphors for the various types of communities, organizations, and levels of support within and beyond the university that are helpful for an emerging science communicator's development—especially one who is also a boundary spanner. Some examples and questions are added to help reflect on the relevance of these roles beyond my own personal story.

engage the public, whether in relation to the cause they endorse (e.g., climate action, social justice) or in relation to an identity they hold (e.g., Latinx in STEM). A cathedral can also become the central hub for a broader network, serving as a launching pad or broker for opportunities by facilitating connections.

As a science communicator to Christian communities, my foundation is the American Scientific Affiliation (ASA; https://network.asa3.org). Established as a professional society in 1941, the ASA is the world's longest standing international network of Christians in the sciences. ASA members range from scientists to theologians and philosophers, and they hold a broad spectrum of views on science and Christian faith. They hold annual meetings, online and in-person meet-ups, and host the peer-reviewed journal *Perspectives on Science and Christian Faith*.

Bringing a cathedral to the center of one's development helps science communicators to join a continuum of efforts as opposed to "reinventing the wheel." As I engage with Christian communities across various venues, I hold true to the ASA's mission, and this mission also helps me to establish a trust with communities that reaches beyond my own personal abilities as I enter new spaces. My cathedral serves as a meter of expectations for my personal demeanor, my core values, and my central message or approach. In my case, my meter is centered around open, humble conversation, especially over issues where there is honest disagreement within my community (American Scientific Affiliation, 2024).

By choosing to stand by the ASA's core values, I have been able to connect and engage with various other faith-based organizations and universities, both nationally and internationally. Leaders of the ASA interviewed and profiled me on their member page, and it resulted in interviews by many other organizations, podcasts, and magazines as a snowball effect. The ASA also gave me access to top experts on various science and faith perspectives, which helped me to listen, learn, and determine gaps as I discovered my own niche as a science communicator in this realm.

Boundary spanners in science communication should be encouraged to seek organizations and partners that best represent the core values from which their engagement work springs forth. As a student, I joined a professional society, but for others, their foundation can come from a special interest group or being part of an existing project.

The Village School

A school represents the institution where science communicators are trained, conduct research, teach, publish, and perform other scholarly activities. It serves as the core affiliation that gives scholarly credibility for their outreach and engagement. It is also a place where a science communicator can develop proper scholarship and training in outreach and engagement itself. Schools can be represented by research institutes, government agencies, or wherever else a science communicator holds their working affiliation. In essence, it is their home base. Unlike the cathedral, which is centered on the science communicator's values and mission, the school intersects with mission but is also centered on training and academic rigor. Academic rigor also relates to the scholarly boundaries under which a science communicator engages (i.e., the scientific dimension of what is covered as a public speaker would typically relate to their field of expertise or the research they pursue). Schools also serve as "neutral ground" for science communicators as they reevaluate their outreach activities and develop and refine their personal and academic identities.

For me, my school is where I get my PhD training: Michigan State University (MSU). My coursework, research, and participation in multiple ecology labs and working groups help me to innovate within my field and stay up to date on current issues, which prepares me as I engage with the public. My academic scholarship is also directly related to the topics I discuss as a science communicator (i.e., I "stay in my lane").

My school has also provided me with ample training and scholarly resources in outreach and engagement. MSU's Office of University Outreach and Engagement offers a Graduate Certification in Community Engagement that teaches 20 core competencies in community-engaged scholarship (https://gradcert.engage.msu.edu/about). Their office also hosts workshops on constructing and writing broader impacts activity plans to meet requirements for grants from the National Science Foundation.

A school helps emerging science communicators to explore the various ways that their expertise can contribute to communities and reflect on those experiences. During the first years of my PhD, I got involved in student government and coding workshops, giving me exposure to politics, fund raising, and underrepresented gender empowerment. It was when I learned about impact identities (a scholarly term for the intersection of one's discipline, scholarship and research, capacities and skills, institutional context, personal preferences, and society's needs, which together create a unique space for broader impact; Risien & Storksdieck, 2018) that I reflected and found reason to prioritize my efforts toward faith-based communities.

While boundary spanners in science communication fulfill their main scholarly duties, they should be encouraged to take classes, join workshops, or participate in groups that allow them to develop their scholarship and fine-tune their outreach methods.

The Parents

Although classic medieval history often emphasizes hierarchical structures, family was also important during this period, as parents, children, siblings, and other kin held a close sense of attachment and worked together to maintain the household and proprietary land (Dyer, 1994, 2022; Razi, 1993). Parents in a science communicator's village serve as personal mentors for development. They can be a person or persons who walk alongside the science communicator as they discover themselves and how their societal impact relates to their identities, personal interests, and goals. Parents may or may not be individuals from the village's cathedral or school; they can originate from other important spaces or communities in a science communicator's life. The difference between parents and cathedrals or schools is that parents support the science communicator in a way that transcends values, mission, alliances, and scholarship. The transcendent nature of the parental relationship gives emerging science communicators the ability to shift focus, mission, identity, or community while having consistent, independent support along the way. In a sense, parents are present in the village to "watch them grow up."

I have two parents: my undergraduate advisor who has become my mentor and "papa," and my spiritual "mama" from my church. These parents have raised me in ways that intersect with both my professional identity and my personal identity. My "papa" has been present over my entire professional development journey. I have known him ever since I entered higher education. My "mama" entered my life many years later, right as my science communication work began to accelerate and I was recentering my personal faith. I consistently speak with my "papa" and "mama." They lament with me about my disappointments, deliberate with me about important choices, and celebrate my successes.

Parents are reliable sources of encouragement. As emerging science communicators are straddled between their communities' needs and the needs of their institutions or organizations, parents are purposely biased toward the science communicator's ultimate well-being. Boundary spanners in science communication should reflect on the person(s) in their lives or along their journeys with such characteristics and (re) connect.

The Elders

In medieval times, "the younger generation was clearly expected to be respectful of their elders, and there is evidence of regard for the wisdom of seniors when they were asked to use their memories to resolve disputes and matters of custom" (Dyer, 2022, p. 134). For an emerging science communicator, village elders are those who are well-experienced in science communication, representing an earlier generation. Unlike parents, who may have different backgrounds, elders most closely overlap with the emerging science communicator's calling and mission. They can be podcasters, vloggers, TV program hosts, professors, organizational leaders, magazine or news article columnists, or social media influencers, among others. Emerging science communicators watch, listen, and learn from their elders, heeding their advice to avoid mistakes, and carrying their elders' legacies with them as they innovate new approaches. It is not necessary to meet or have a strong relationship with an elder. Instead, lessons are often learned at a distance by reading their materials, watching their presentations, listening to their interviews, or through informal mentoring from brief engagements with an elder. When a stronger relationship with an elder does exist, emerging science communicators can also contribute to their elders by offering fresh perspectives.

My elders are science communicators who speak on the topics of "creation care" (also known as conservation or environmental stewardship in secular terms). I have met or listened to many of my elders through in-person or online events from the ASA, BioLogos (https://biologos.org), the Evangelical Environmental Network (https://creationcare.org), and the American Academy for the Advancement of Science Dialogue on Science, Ethics, and Religion (AAAS-DOSER; https://sciencereligiondialogue.org/). My elders are keynote speakers, career panel guests, and news/podcast interviewees, with roles as scientists, theologians, and organizational directors. I watch my elders' presentations and style, take note of how they answer difficult questions from audiences, and observe their character off-stage. I listen to the criticism my elders receive, both from the public and their peers, and strategize better ways to be a bridge builder as part of the next generation.

Elders serve as a means to watch and learn as an emerging science communicator scopes the field. Gauging the boundaries and settings where elders occupy space can help boundary spanners in science communication determine whether they can best serve communities as a reverberating echo of a central message or present something new. Emerging science communicators should be encouraged to identify their elders, make themselves known to them, and seek their advice.

Kin

Beyond the nuclear family, medieval households had networks of kin relationships that helped to fill gaps when families faced demographic failures or crises such as limiting gender roles or plagues (Wheaton, 1975). In this way, medieval kinship was a mechanism to sustain families when vulnerable to ensure the longevity of the family name. Similarly, kin in a science communicator's village are peer-level sources for encouragement and vulnerability. Whereas parents offer encouragement and support as mentors or counselors, kin emphasize an excess, superfluous engagement that can organically stimulate growth. Because they are not necessarily linked to the science communicator's scholarship or public platform, kin may offer lenses of differing experiences and values, leading to broader perspectives for the emerging science communicator. Similarly, the reciprocal nature of kinship allows the science communicator to broaden their kin's perspectives in return. As peers, kin can also offer an environment where the science communicator can be "raw" and authentic as they share and reflect on new experiences and challenges.

My kin include fellow lab members, graduate students, postdoctoral researchers, friends, and many others who have been a part of both my academic and personal life over the years. They are Christians, agnostics, atheists, or hold other kinds of spiritual beliefs, and have various professional backgrounds, from retail to government to academia. Not all my kin understand my faith or profession, but I can maximize on those gaps to consult with them about my slides, illustrations, interview responses, or ability to describe difficult concepts to broad audiences. I also can confide in my kin, and even complain, as I reflect on some of my experiences. While I have developed as a science communicator, my kin have also gained an insider's view that has caused them to engage in new ideas.

Having a space for raw authenticity and vulnerability will be important for emerging science communicators as they juggle tensions both within society and within themselves during their development. As they process experiences, boundary spanners in science communication should feel welcome to share their work with whoever they consider kin.

The Village Children

Being young in medieval times was challenging, as child mortality rates were incredibly high (Griego, 2018; Lewis & Gowland, 2007). Hence, village children symbolize those who need special attention and care to succeed beyond the norm. Village children are others with less experience who are exploring and defining their own journeys and are inspired by the science communicator. Unlike kin, children will overlap in the science communicator's values, profession, and/or scholarship. They can identify with the science communicator at some level that drives them to be formally or informally mentored. Village children serve as prompts for science communicators to evaluate their outreach and engagement experiences in a way that transforms into valuable lessons and applications for future scholarship on their activities. Motivating the next generation, children also represent a valuable connection that can directly influence their trajectories.

Through the ASA and Emerging Scholars Network, I have participated in multiple early career panels and speed mentoring sessions. The Emerging Scholars Network is a national network and ministry that

> supports those on the academic pathway as they work out how their academic vocation serves God and others. [They] encourage and equip undergraduates, graduate students, postdocs, and early career faculty as they navigate each stage of their academic vocation and transition to the next step in or beyond the academy. (Emerging Scholars Network, 2020, para. 1)

On these mentoring panels, I have sat alongside graduate students, early career and retired professors, and popular scientists from various fields. In front of large audiences of students and early career scientists, I answered questions on both my spiritual and professional journeys, and reflected on other parts of my identity, such as being a woman of color in science. Sitting in smaller focus groups, I asked questions to encourage students to self-reflect. After talks or panels, I make myself available for one-on-one, private discussions held in an informal, personal mentoring style.

Village children have the power to keep an emerging science communicator reflective, grounded, humble, and grateful as they recognize the rareness of their successes and opportunities. For boundary spanners working in sensitive, unconventional, or controversial topics, village children serve as reminders of personal compromise or sacrifice that others may not be able to make at a similar level. The intangible recognition as an overcomer can also motivate a boundary spanner to keep moving for the sake of those who come after them.

Boundary spanners in science communication should make themselves available for such humble moments. Participating in speed mentoring or career panels during the nascent stage of a science communicator's career will also help them to practice establishing the private and public boundaries of their personal stories—especially before they become well-known. Early career panel hosts should consider emerging science communicators as guests in addition to those who are already popular and established.

The Village Guards

Like walls or gates surrounding a medieval village, village guards are people or groups whom emerging science communicators can consult when they need to redefine their boundaries and reach in order to stay professionally safe. Whereas cathedrals, schools, and parents can offer shelter for emerging science communicators through their procedures, policies, and guidance, village guards can stand at the edge of the broader village system or above it and help emerging science communicators to define appropriate lines for their work and platform. Village guards are not gatekeepers that establish boundaries on the science communicator's behalf or block community engagement activities. Instead, they are guides to help science communicators draw their own boundary lines safely.

I consider MSU's Office of University Outreach and Engagement to be my guard. They serve within the school component of my village, where they offer formal scholarship and training, but their practical experience with a multitude of engagement projects and communities helps me to seek perspective. Similar to guards who stand on high towers and look for significant and alarming movements, Office faculty can pull my field of vision away from a single situation and bring it into a larger context. As part of the Graduate Certificate in Community Engagement program, the weekly open office hours offer an availability where I can seek counsel on situations as they arise. Because the relationships I hold with my community are not facilitated or maintained by my university, my guard is not a mediator for solutions, but instead offers helpful advice.

As boundary spanners in science communication emerge, there can be much excitement about the new spaces they fill, but they need to learn to manage and adjust community expectations. Especially for a boundary spanner holding multiple underrepresented identities and an interdisciplinary scholarly background, gaps in diverse voices for other platforms or causes can open a diversity of platforms and opportunities. I have learned to be careful about stretching my abilities and to also make space for other boundary spanners to fill those roles. As boundary spanners in science communication practice such decision-making, they should seek help in learning how to say "no," and how

to do it gracefully to minimize damage to their bridge building and trust efforts with their communities.

Tradespeople

In a medieval village, tradespeople enhance the welfare of others, such as apothecaries that find cures, blacksmiths that create and dispense tools, and tailors that make clothes to craftily boost their customer's public image. In a science communicator's village, tradespeople represent professionals of differing expertise (e.g., science, theology, leadership, journalism, outreach) that help the science communicator find solutions to complex problems and expand their skill sets and equipment to enhance the delivery of their message. They are only occasionally present in the science communicator's development, and differ from village elders because they do not necessarily overlap with the science communicator's work and mission. Like an assortment of herbs in an apothecary's cabinet, or a set of tools in a blacksmith's workshop, tradespeople form a hub of targeted resources.

My tradespeople are university professors, professional society members and leaders, church pastors, missionaries, journalists, and editors. As a student, I go to my professors when I have trouble illustrating or articulating complex scientific ideas in lay terms. I show them presentation slides or article snippets for comments and critiques. Through the connections I make at professional society meetings, I pitch new ideas and seek members' knowledge and opinions. Church pastors and missionaries also serve as resources as I fuse motivational speaking with spirituality for conservation action. Journalists and editors enhance my writing abilities whenever I write news and opinion articles for them (Frans, 2022; Frans & Liu, 2022).

Although tradespeople are considered resources for help and materials, they also form a vast network of supporting community members. Throughout the course of their engagements, boundary spanners in science communication are sure to meet many experts who can become professional friends. I stay in contact with many professional friends regardless of whether they contribute to my development. Emerging science communicators should learn to regularly keep in touch with their tradespeople—even for updates on each other's progress and for moments of celebration.

Science communication requires a lot of creativity so audiences can understand and remain attentively engaged. Attending workshops on data visualization, scientific illustration, videography, photography, painting, or poetry can help science communicators develop a large breadth of new abilities. Technology such as microphones, cameras, lighting, or visualization software can also form part of their toolkit. At early stages in their careers, boundary spanners in science communication can face tensions if the tools or skills they require are outside their program or beyond what their institution normally provides. They should assess their needs and determine whether they can compromise by borrowing materials from libraries or other departments, joining multiple short-term workshops that accumulate into a comprehensive skill set training over time, relying on materials from organizations or venues that host them as invited guests, or explicitly seeking funding and support for their outreach activities.

Wealthy Patrons

In medieval times, wealthy patrons were nobles, lords, or other wealthy people who financially supported artists as they created pieces reflecting the patrons' values. Similarly, a wealthy patron in a science communicator's village represents a means of financial support that specifically targets their outreach and engagement activities. Wealthy patrons help science communicators flourish in their creativity and reach.

For a student, volunteering resources for outreach and engagement can get both temporally and financially expensive. When I first started, most of my science communication was achieved online, which helped me to build enough credibility at smaller scales to later seek support for larger scaled opportunities. Eventually, when I was invited to speak at events that I really wanted to attend but could not afford, I sought financial support. From my own personal judgment or from seeking counsel from my village elders or parents, I evaluated when it was appropriate to request that venues or community members help financially support my participation at in-person events. I also applied for awards and fellowships that honored my science communication activities and used that financial support to travel to conferences and speaking events or purchase books and software for topics outside my PhD dissertation.

Boundary spanners in science communication should of course be excited for each new area that they are able to reach, but they also need to take a realistic approach, recognizing that at an early stage of their careers, not all sacrifices for a cause need to be personal. The work of boundary spanners should be valued and recognized, and it is a good exercise for them to seek support for the niches they are able to fill. Emerging science communicators should apply for outreach and engagement awards and supplemental project awards. Where possible, writing proposals for funding outreach activities can also train them in writing and preparing broader impacts activity plans for grant proposals such as the National Science Foundation Postdoctoral Research Fellowships. On some occasions, organizations may offer speaking honoraria, which science communicators should not feel uncomfortable about receiving (sometimes such funding is a normal part of their programming); however, they should learn about any terms and limitations of their home institutions prior to accepting them.

The Town Crier

Town criers in medieval times were the best way to hear and spread important news. For science communicators, the town crier is a person or persons who calls special attention to the science communicator's engagement activities, scholarly work, and professional achievements. Similar to the role of a school, the town crier's role of promoting a science communicator's scholarly and professional achievements can enhance their public recognition and credibility within their field. When promoting engagement activities, the town crier can also call attention to upcoming activities that lead to increased following and attendance. Announcing successfully completed activities helps village cathedrals and schools stay apprised of science communicators that are affiliated with them and can also inspire invitations from other groups.

I have a network of town criers. Some town criers oversee media and communications for my department, my lab, the university, or for some Christian organizations with which I engage. They are also popular online influencers with many followers. For me personally, my town criers are more like advocates and supporters of my mission, as opposed to just workers forwarding my news. They openly celebrate me as they amplify my work on my behalf, and even take the time to read (or watch) and summarize my work in their own words. The work that my town criers celebrate is not only what I do in relation to outreach, but also my original research. For example, when my research on New Zealand sea lions went viral and was picked up by the press (Frans et al., 2022; Graham-McLay, 2021), pastors and missionaries shared it. I am fortunate that my town criers do not discriminate between subjects, but instead recognize and celebrate all aspects of my identity and career as a scientist.

It is important for boundary spanners to notify their institutions when they make headlines. Coming from a large university, I realized that if I do not directly notify town criers myself, my news risks going unnoticed. I also have learned to not take offense if town criers cannot share some of my news on my behalf. News moves quickly, and there are other members of my community and within my institution who should be equally celebrated.

If an emerging science communicator does not have a town crier, a good start would be to personally broadcast their work and outreach activities via email or discussion lists, make their own social media posts, or use relevant hashtags or bots. It is also important to note that spreading news is a multidirectional social activity. Science communicators should practice being town criers themselves by engaging and promoting the works of others. Gratitude for such efforts can lead to reciprocation.

The Jester

Although mostly serving in the courts of a lord, a jester in medieval times was a professional entertainer who would mock others, tell jokes, and perform tricks (Doran, 1858). The jester was well aware of political and social matters, speaking truths through satire. For a science communicator, the village jester symbolizes a person who holds opposing or challenging views about the science communicator's outreach endeavors. Put simply, the jester is a skeptic or a critic. A jester's words play key roles in shaping the science communicator's character, and can positively contribute to their growth. Of note, engagements between science communicators and jesters should not result in enmity, even if some misunderstandings and challenges get intense. No matter the jester's behavior or demeanor, the science communicator focuses on what

is within their own abilities and responsibilities, which is to consistently recenter themselves on the foundations of their village cathedral when necessary.

Listening to jesters helps me to think outside the box and sharpen my reasoning. Jesters are found in all parts of my village. They are other science communicators with different missions, values, and beliefs who try to steer my own mission and values into another direction; they are audience members or social media followers who present information that challenges the integrity of my message; or they are people who disagree with me in science, theology, or policy because of deeper issues that I am incapable of addressing. They are professors, fellow students, friends, or strangers. I never sense malice or ill intentions from my jesters, but instead, genuine concerns that stem from their own experiences, philosophies, and reasonings. As an early career professional, I am also humbled by jesters as I realize the breadth of their knowledge on some topics compared to my own.

Boundary spanners in science communication should become accustomed to having jesters. Critiques and skepticism are not synonymous with conflict. A jester can be a critical friend who "asks provocative questions, provides data to be examined through another lens, and offers critique of a person's work" (Costa & Kallick, 1993, p. 50; MacPhail et al., 2021). They stand along a continuum of levels of experience, critique, and support and can serve catalytic roles, stimulating innovative ideas, social energy, and new courses of action (Goodyear & Casey, 2015; MacPhail et al., 2021). Overall, jesters are advantageous for development despite some initial challenges.

The Mayor

Some medieval villages had a mayor (also known as a lord mayor) that served as their head council. In a science communicator's village, ultimate governance stems from the mayor. Although the mayor may not be involved in the establishment, guidance, or coordination of a science communicator's activities, the mayor still stands as the overseer. Like a government official who is unable to monitor all constituents, the mayor uses general guidelines and principles and expects all village residents to uphold them. From the mayor's perspective, residents have various professions and interests, and the science communicator is just one individual whose interest happens to be in outreach and engagement. Science communicators must thus uphold the mayor's overarching expectations, being sure to profile themselves as upstanding citizens if they want to keep practicing their freedoms and privileges.

My mayor is my PhD advisor—the one who allows me to do outreach but keeps me on track for what matters most: graduation. I am fortunate to have an advisor who celebrates my work in science communication, since only *one* community outreach or engagement activity is actually required by my PhD program and I have done significantly more. I recognize that all I have been able to accomplish as a science communicator is thus thanks to the good graces of my advisor. However, my advisor still holds me to a set of expectations: I need to do my research, fulfill my PhD requirements, and publish. I find these guidelines fair because he equally expects them for all his students. It is also in my best interest to fulfill these expectations because they train me for my career. Conducting research is still my primary interest, so being able to juggle my research responsibilities with my science communication activities prepares me for a postdoctoral or tenure-track position that has research, teaching, and service expectations.

Unless science communication is the only work that they do, science communicators will ultimately be under the governance of someone. Boundary spanners in science communication should not perceive this as a problem, but instead a reality. Especially if a boundary spanner may have a deeper sense of mission with their science communication activities that stems from their personal identities or a critical gap that they are filling, it is important for mayors to make space for open conversation about the science communicator's activities as they work to find a sustainable balance.

To find balance, science communicators should plan their timelines and workloads in ways that are mutually beneficial for their mayor. For example, figures or slides prepared for an outreach activity could be "recycled" for a conference presentation and vice versa. Or, science communicators can focus on publishing first (especially if there is a research embargo), use the peer review process to learn how to manage and correct misunderstandings, and then present their work publicly.

Building Your Own Village

To build new bridges across new boundaries, villages must be built to sustain the bridge builders. Here, I showed that such a village begins with the recognition that the core values and foundational messages for outreach and engagement may need to stem from beyond the university in order to enter new, often delicate, spaces in science communication. Resources and training may also come from outside the university to meet a boundary spanner's needs. Further, spanning boundaries during an early career stage increases the number of metaphorical village roles required to succeed in unique, underserved spaces. It also necessitates time and space for reflection, as well as a diversity of people of different ages, backgrounds, beliefs, and experiences with whom to seek counsel and solace as the science communicator navigates new territories and grows. I encourage others who self-identify as boundary spanners and science communicators to examine their village, discover their needs, and seek ample support.

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