The CSCCE Skills Wheel

Five core competencies and 45 skills to describe the role of the community engagement manager in STEM

Lou Woodley, Katie Pratt, Malin Sandström, Elisha Wood-Charlson, Jennifer Davison, and Andreas Leidolf

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About CSCCE

The Center for Scientific Collaboration and Community Engagement (CSCCE) champions the importance of human infrastructure for effective collaboration in STEM. We provide training and support for the people who make scientific collaborations succeed at scale - and we also research the impact of these emerging roles. We host a vibrant community of practice, with whom we regularly co-create resources like this one. The community managers in our community of practice hail from a variety of research collaborations, scientific associations, and infrastructure organizations, spanning academic STEM collaborations, scholarly communications, and industry ventures.

Find out more about us on our website: cscce.org

Acknowledgments

The CSCCE skills wheel was a product of the C3 [project team](#) of the 2017 cohort of the CSCCE Community Engagement Fellows Program (CEFP), which was funded by the Alfred P. Sloan Foundation. The team members were Jennifer Davison, Andreas Leidolf, Malin Sandström, Elisha Wood-Charlson, and Lou Woodley.

CSCCE uses the CREDiT contributor roles taxonomy to show how the authors listed contributed to the creation of this guide:

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We would also like to thank the many workshop participants and both cohorts of CEFP fellows to date who helped validate and contextualize this skills wheel across a range of scientific contexts.

Background for this skills wheel

Scientific community management is an emerging role found in a range of different contexts including communities of practice, professional associations, infrastructure organizations, and research collaborations. The essential function of a community manager is to align community member goals and create and maintain pathways by which members can engage with one another and/or the community's projects. Actual job titles for scientific community managers can vary quite considerably. In professional associations they may include *Network Engagement Manager*, *Membership Officer*, and *Community Manager*. In research collaborations, these roles may look like *Assistant Director*, especially for large-scale collaborations such as those funded by the NSF EPSCoR program in the U.S. Anecdotally, infrastructure organizations are most likely to use the *Community Manager* title.

Regardless of actual job title, we believe that it's important to have a shared vocabulary to describe the skills required for these roles. This helps both the hiring and professional development processes. It also makes the often-wide-ranging nature of these roles more visible - something that distinguishes these roles as particularly challenging, and even unique, in science.

Skills wheels are a common way of visualizing and curating information about skills that also allow for the creation of a job "signature" or "fingerprint" based on the particular skills in use (e.g., by shading in relevant segments of the wheel). These fingerprints can be compared to help identify how individual roles fit into a broader taxonomy of related roles. A skills wheel example in the context of community management is the one developed by [The Community Roundtable](#), which describes community manager roles in general. CSCCE staff and Fellows developed the skills wheel presented in this guidebook as one step towards describing *scientific* community roles specifically.

This first version of the CSCCE skills wheel is an output of the C3 [project team from the 2017 cohort](#) of the [CSCCE Community Engagement Fellows Program](#) (CEFP 2017). The members of the team were four Fellows: Jennifer Davison, Andreas Leidolf, Malin Sandström, Elisha Wood-Charlson; along with CSCCE Director Lou Woodley. The team carried out a range of activities to create the wheel presented here, including comparing the skills listed in a range of scientific community manager job descriptions, surveying scientific community managers within the 2017 CEFP cohort, and undertaking additional literature analysis regarding similar models. From this work, they identified the five core competencies and component skills that make up the wheel.

This guidebook is intended to be a brief, practical introduction to scientific community manager roles, providing a starting point for discussing common questions about this work. It is not intended to describe the methodology behind the creation of the wheel, which is the focus of another output. CSCCE will be coordinating further activities in 2021 to continue to iterate this wheel, with the goal of creating a taxonomy of community management roles in science. If you would like to contribute to this work or collaborate with us in some way, please get in touch by emailing info@cscce.org.

What is the wheel for?

The skills wheel, along with the answers to the FAQs below, are intended to be useful in a variety of situations:

- **Hiring** - The precise combination of skills required for a particular community manager role may vary, depending on the project and organizational context. By using the wheel, hiring managers can easily identify and name what they are looking for in a new hire.
- **Professional development** - Individuals working in a community management role can use the wheel to identify areas in which they might benefit from professional development. For example, they may excel in interpersonal skills but benefit from additional technical training.
- **Community team skills** - Similarly, a senior community professional can use the wheel to take a look at the cumulative skills of their team and determine whether all their needs are met. If not, this gap analysis can also help when considering a new hire.
- **Personal development** – The wheel can also be used to explore personal fulfilment in a community-building role. For example, a community manager who frequently uses a set of skills that they do not enjoy, might seek to re-distribute projects across a team or may even look for an alternative role.

For many, the skills wheel may help them realize that the job they are doing IS community management! In developing the wheel and reading numerous job descriptions, a variety of job titles are currently in use to describe this role in STEM, including *network engagement manager*, *program manager*, *science communications officer*, *research community engagement manager*, *research development manager*, and *community engagement specialist*.

The skills wheel

Scientific community managers use a range of skills in their roles. The CSCCE skills wheel is composed of five core competencies, with nine skills within each competency, as outlined in the figure below.
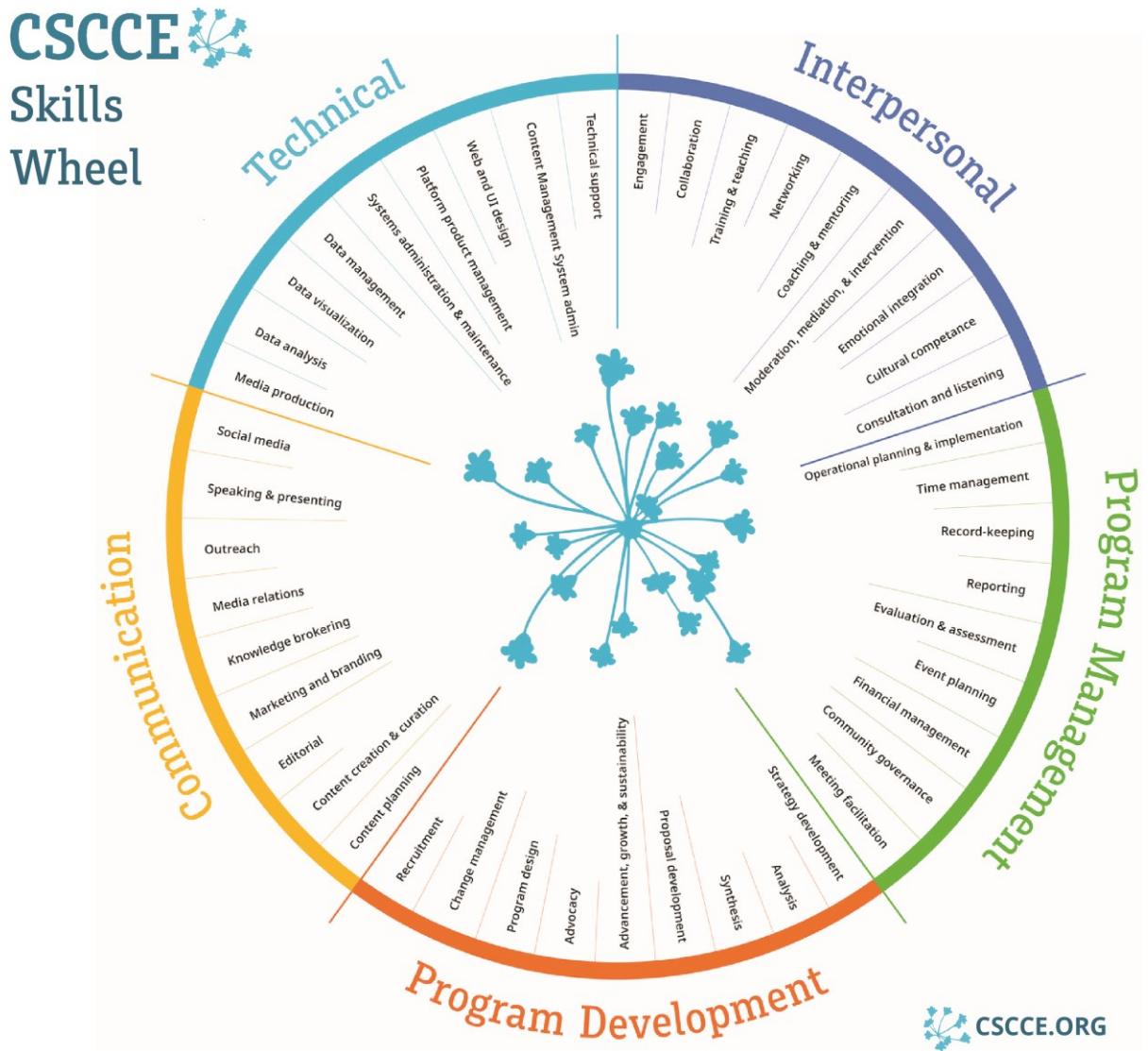
Figure 1

The CSCCE Skills Wheel. The wheel shows the five core competencies of scientific community managers: interpersonal, program management, program development, communication, and technical. Each competency is comprised of nine skills. The wheel is the product of the C3 team of CEFP 2017 Fellows.

The five core competencies are:

INTERPERSONAL

Interpersonal competencies include skills such as personal effectiveness, cultural awareness, and emotional regulation that are key to effective and inclusive teamwork.

PROGRAM MANAGEMENT

Program management competencies are the skills required for the day-to-day administration of a collaboration or community - from time management to allocation of resources.

PROGRAM DEVELOPMENT

Program development competencies include the skills required to plan, assess, and advance a project - from strategic planning to evaluation.

COMMUNICATION

Communication competencies span a range of skills from planning, creating, editing, and delivering information - whether in written or meeting formats.

TECHNICAL

Technical competencies span technical support to product management.

In the appendix, we have included definitions of each of the skills and also examples of how these skills might manifest in two different contexts: research collaborations and professional associations.

Note: Every community manager will have their own wheel signature, which may also change over time.

What distinguishes a *scientific* community manager?

Firstly, science is inherently a community-based endeavor. The generation, validation, and dissemination of knowledge requires a network of diverse roles and a range of community configurations to meet specific needs - whether those needs bridge across disciplines, career stages, institutes or other boundaries. Communities in science are also key to the ongoing cultural shifts in how science is carried out - from open science to DEI efforts, communities provide places to try, iterate, and adopt new norms.

At the current time, we see scientific community managers in two very broad types of roles (with multiple context-specific variations). The first are community managers whose primary role is to support communication and collaboration for a specific project or community. The second broad

type of community manager is a hybrid role - including many academic roles - where the community manager may additionally be carrying out some other function, such as research. In this context, the individual is typically not called a community manager, although brokering and supporting connections is vital to the success of their role. (Note that in the appendix, you can compare examples of these two types of roles; science association community manager and research collaboration community manager, respectively; in action.) In this sense, the term scientific community manager is an umbrella term under which a taxonomy of roles exists. We are actively continuing our research in this area to more fully understand and describe such a taxonomy.

That said, in both types of role, a scientific community manager typically has some familiarity with the STEM field they support. Our 2016 landscape survey showed that more than ⅔ of scientific community managers have a scientific Masters or PhD degree. Others may have years of work experience or successfully partner with community team colleagues who are scientists. Regardless of how they got there, they frequently have some fluency in the technical language of the community, have awareness of its cultural norms, and may additionally use this understanding to support work across disciplines as translators, e.g., facilitating a joint workshop to connect research scientists and database managers.

How do you define a skill? What is the difference between community manager attributes and skills?

CSCCE considers skills to be things that can be augmented by training, e.g., a community manager could receive training in social media strategy to become more proficient at that aspect of their role. By contrast, attributes tend to be more innate preferences that an individual may have, e.g., comfort with ambiguity, ability to connect different ideas across a system, or enjoyment of social interaction. While the community manager's environment and experiences may certainly influence the expression and strength of those attributes, they are not usually dramatically changed by conventional efforts such as training.

This skills wheel does not address community manager attributes, although these are a topic we discuss in our trainings (e.g., our Scientific Community Engagement Fundamentals course).

Should scientific community managers be using skills in all 5 of the core competencies?

Our working hypothesis is that scientific community managers use at least some of the skills in each of the five competencies of the wheel. However, your precise "fingerprint" (how often you use a skill or how competent you are in a given area) might be quite different from another scientific community manager.

However, there may be a core set of skills from the wheel that are common to all scientific community

managers, and we are still exploring that possibility and what a taxonomy of scientific community manager jobs might look like. Our preliminary investigations suggest that the most variable competency is technical, which generally reflects the scientific discipline of the community and whether the role has a product management or product marketing component. For some scientific community managers, this area of the wheel is least represented in their fingerprint.

Is one of the competencies more important to community managers than the others?

We've used the skills wheel in multiple trainings and workshops, reaching well over 100 scientific community professionals from a range of contexts. This has consistently shown that the INTERPERSONAL competency is the one that scientific community managers most strongly resonate with. They frequently express relief when these often invisible - and therefore under-recognized - skills are named as a core part of what they do. And, as a result, they have felt empowered to negotiate changes to job descriptions and initiate conversations about their role within their organization. This isn't to imply that the other competencies are less important, but the value the wheel provides in legitimizing the less visible interpersonal skills is significant.

Are scientific community managers expected to master all 45 skills described in the wheel?

No, although you may surprise yourself with how multi-skilled you are! Community management roles are often busy and somewhat ambiguous - requiring rapid switching between a broad range of skills. Plus, it's likely that the skills you deploy will vary with the stage of your community or the programming cycle it follows, e.g., if there is an annual meeting or other annual event. Be sure to revisit the wheel and your upcoming tasks regularly and find ways to support yourself, and your team if you have one, to ensure everyone feels confident when events require you to move from one area of the wheel to another.

Finally, a reminder to be kind to yourself! The lack of visibility, lack of peers, and lack of institutional support means that burnout is a very real challenge. While you may possess skills in all 5 areas, none of us are super human so don't set up expectations that you can (or will) master all 45 skills during your career - or that you'll necessarily enjoy them all. Ask for help. Establish a network of support. Find other community managers with whom you can share ideas and frustrations, successes, and failures. You can find many of us in the CSCCE community of practice on Slack (request to join).

Have you seen any variation in the usage of skills between community managers in different roles or at different stages of their careers?

Great question! Scientific community management is still an emerging and evolving role, so it is difficult to make generalizations about the configuration of skills used in different organizational contexts or how they evolve over time. Indeed, not all organizations that have a community manager name the role *community manager*, and in some cases it's a hybrid role. For example, in infrastructure organizations and scientific associations *community manager* is an increasingly common job title as these organizations recognize the community-centric nature of their missions. By contrast, community management is not a job title in academic research contexts (but the role still exists!), despite the increasingly collaborative nature of large-scale interdisciplinary projects.

Part of the importance of defining a taxonomy of roles and organizational contexts is that it will allow us to iterate on this skills wheel to create more nuanced configurations. For example, we might define hybrid academic roles where community management is only part of what an individual does. That person may also carry out another scientific function such as grant management. Grant management is not currently included in the skills wheel because it was not present in our initial data set of job descriptions and so hasn't been identified yet as a core skill. Since the field has evolved over the last few years, we may find that this has actually changed for a subset of roles.

How might the distribution of skills change depending on the stage of the community or its current goals?

Brand new communities (with new community managers) may need to spend a lot of time getting things up and running. Program development (*proposal and strategy development*), communication (*content creation*), and technical (*web design, content management*) skills are likely required to set up the framework and messaging on which your community will be built. As the program rolls out, program development will still play a strong role (*recruitment, advocacy*), and communication may begin to include outreach and social media to promote awareness and gather interest.

As the community grows and becomes more active, community management skills will likely shift into program management. Planning, running, and evaluating the success of each engagement activity spans many of the skills within program management. And, once the community starts to be populated with people (or your team grows), interpersonal skills become increasingly important for nurturing and maintaining those relationships. These skills are what really set the tone and culture of your organization, your community, and your future.

The goals of a community can also impact where on the skills wheel you might spend much of your

time. If your community is focused on building a network of people, resources, or a community of practice, then program management and program development skills will be very important. Perhaps your community aims to promote culture change (e.g., open science) and needs to get buy-in from a variety of stakeholders. For those efforts, you may need to spend a lot of time using skills in the program development (*advocacy, advancement*) and interpersonal (*networking, consultation and listening*) competencies.

Regardless of where you are now in the wheel, it is always good to remember that these skills (and community manager jobs in general) are never a one-size fits all formula. Community manager roles will continue to evolve with their communities, and with the roles of others supporting the community, so it is unlikely you'll be using an identical combination of skills 12 months from now.

What about if I'm part of a community management team? How might the wheel be useful to us?

If you have several community team members, this skills wheel will help you clarify each person's unique skill set, and let you compare the overall makeup of the team. It will help you find skills gaps - where you may need to hire more people or re-train members of your existing team - and it can inspire your community professionals to broaden, or alternatively, deepen - their roles as your organization needs.

Can I use this wheel to inform the hiring process?

Yes! The skills wheel can be very helpful while building out job descriptions by helping you as a supervisor identify and articulate what you are looking for in a new hire. For example, you can use the wheel to ask: "what skills are missing in my team?" Then, you can write the description to match your needs. It can also be helpful when considering the makeup of your hiring committee, as you will want to ensure the members of that committee are prepared and able to assess a potential candidate for the skills you desire. Lastly, once you have decided on a new hire, you can use the wheel to help in the on-boarding process to demonstrate or identify areas in which you might ask for or provide immediate training (e.g., taking the CSCCE Community Engagement Fundamentals course or acquiring a specific technical skill).

How can I use this wheel to help identify future professional development needs?

In CSCCE trainings we regularly use the skills wheel to help participants self-evaluate their own skill set. By scoring yourself, or having your supervisor score you, you can quickly identify areas in which you might need additional training. If the skills you need to expand or improve overlap significantly

with the needs of your role, these are promising areas to investigate for additional training opportunities.

How does CSCCE use this model?

CSCCE uses our skills wheel for both training and research. You can read more about training options on the CSCCE website.

In terms of research, we are interested in a range of related questions about how community managers spend their time and how their roles evolve, as well as continuing to explore and define the range of different community management roles in STEM. We plan to share further information about these projects once we have additional outputs. If you'd like to collaborate with us on a future project, please email info@cscce.org.

Can you help me relate this skills wheel to my own role and/or my team?

Yes! We offer 60-minute consultancy sessions for individuals or 90-minute workshops and webinars for teams. In a consultancy session you can expect to speak with a member of our team to troubleshoot specific questions, e.g., creating a job description for a new hire. Our workshops and webinars can be tailored, but in general include a brief introduction to community management and an activity using and discussing the skills wheel. For more information and pricing please contact info@cscce.org.

We also cover using the skills wheel in our Scientific Community Engagement Fundamentals 6-week online training module, which is perfect for community professionals in STEM who are looking to deepen their ability to build and nurture communities. You can find out more about this course, as well as our other online modular trainings, on our website.

Further reading

CSCCE RESOURCES

Hiring / Becoming a community manager - If you're looking to hire a community manager – perhaps for the first time – this collection of resources includes tips for doing so. It also includes information for first time community managers, or those who are starting to realize that their roles involve community management.

Being a scientific community manager - Whether you're a first-time scientific community manager or have been supporting communities for some time, resources on this page will help you to address some common challenges – from time management and making the most of networking to maintaining strong relationships with stakeholders.

State of Scientific Community Management 2016 - In 2016 we carried out a survey of over 100 scientific community professionals to determine more about their career paths to date, their skill sets and challenges.

View all openly available CSCCE resources.

Appendix: Glossary of skills and examples

INTERPERSONAL	Interpersonal competencies include skills such as personal effectiveness, cultural awareness and emotional regulation that are key to effective teamwork	Example of skill used by science association community manager	Example of skill used by research collaboration community manager
1 Engagement	Facilitate contributions from and interactions between community members that encourage participation and positive attachment to the community	Responding to user comments in an online discussion - especially if no one else has	Invite collaborators to a dinner for informal connection
2 Collaboration	Work effectively as part of a group by sharing, responding, and contributing to the group's activities towards a shared goal	Solicit questions from community members that they would like the organization to present on their behalf to a congressional hearing	Work with research leads to develop key points for the annual report
3 Training and teaching	Effectively transfer knowledge and skills to a diverse audience of learners	Devise and host a webinar with Q&A each month for new members to orient them to key features of the community platform	Modify workshop on data management best practices for undergraduate student researchers
4 Networking	Develop, maintain, and map relationships across the community and the landscape of stakeholders	Meet members in person at annual meeting including attending events organized by local chapters to meet coordinators and their colleagues in person	Attend the weekly departmental seminar to connect with key stakeholders in an informal setting
5 Mentoring	Create an adaptive and supportive environment for professional and personal development and growth. Provide learning opportunities, guide conduct, and model behavior	Invite a community member to participate in a member spotlight Q&A and provide the support and encouragement needed for them to have a positive experience	Help a graduate student prepare their first poster and follow up on how it went
6 Moderation, mediation and intervention	Modify or redirect behaviors toward desired modes of expression, processes, and outcomes. Moderate interactions and resolve and de-escalate conflicts. Effectively manage up, down, across, and outside of organizational hierarchies	Ask community member to edit a comment that uses inflammatory language in order to promote respectful discussion	After a conflict in a monthly conference call, speak individually with both parties to understand the background and possible paths to resolution
7 Emotional integration	Recognize, identify, and work with personal and individual community members' emotions	Identify when community members feel impassioned by a topic and create new opportunities for them to take action	Identify when a team member is frustrated that their input has been overlooked and note whether other members are feeling the same
8 Cultural competence	Understand and appropriately engage with the unique combination of cultural attributes and identities that members of the community bring to interactions	Ensure that the participants invited to host member spotlight discussions represent the diversity of members in the community and the unique challenges they may face	Schedule meeting times that respect childcare arrangements, family time, religious holidays, and other events ensuring the participation of under-represented members
9 Consultation and listening	Leverage internal and external knowledge, skills, and expertise. Solicit, be open to, and incorporate community members' opinions and views	Set up focus groups for group admins about proposed new features or programming for the online community	Create a mechanism for feedback from group members, such as facilitating time at the end of every meeting for open discussion

PROGRAM MANAGEMENT	Program management competencies are the skills required for the day-to-day administration of a collaboration - from time management to allocation of resources	Example of skill used by science association community manager	Example of skill used by research collaboration community manager
1 Operational planning and implementation	Align operations with strategic goals by developing work plans and assigning people and other resources. Track progress and adjust plans	Create a roster to ensure continued customer support when a community team member is out on vacation	Aid the community in travel planning and shipping equipment prior to a field expedition
2 Time management	Triage, prioritize, and schedule work to achieve community goals	Hold a morning stand up meeting with other community team members to review and prioritize tasks for the day	Coordinate timeline for press release around the schedules of research leads
3 Record-keeping	Track staff and program resources, time and effort expended, and community demographics and metrics	Keep a record of monthly visits to the community blog	Keep a record of publications authored by members of the collaboration
4 Reporting	Communicate community outcomes and impacts to various stakeholders, including funders, collaborators, senior management, community members, and the public	Provide monthly dashboard of key community metrics to senior management	Provide annual progress reports to funders including budget expenditures, accomplishments, and key outputs, outcomes, and impacts
5 Evaluation and assessment	Determine whether community activities are achieving objectives and target metrics. Solicit feedback via user surveys, focus groups, and informal mechanisms. Make recommendations based on findings. Coordinate with external evaluators	Run focus group about member experiences of their first year in the community	Work with an external evaluator to create an assessment plan and timeline for the collaboration
6 Event planning	Manage community gatherings by developing timelines and agendas, coordinating speakers, venues, travel, and materials, and overseeing day-of event implementation	Organize a hackathon for members attending the annual meeting	Coordinate with the organizers of a conference to develop and staff an interdisciplinary panel for an invited session
7 Financial management	Oversee and administer program budgets and provide audit support	Provide monthly budget reports to senior management	Provide monthly updates on grant spend-down to collaboration PIs and leadership
8 Community governance	Coordinate, document, and ensure compliance with established procedures for decision-making. Formulate new policies to promote community cohesion and accomplishment of organizational goals	Establish a code of conduct for community interactions online and in person	Draft a data sharing policy, get it signed off by all PIs involved in the project, and make it available to everyone
9 Meeting facilitation	Set intentions and expectations for interactions and outcomes and provide necessary resources. Structure, model, and adaptively guide participant behavior and contributions and manage group dynamics. Identify gaps, reflect, synthesize, and enable next steps	Share guidance with community members about how to participate in a webinar Q&A	Ensure all collaborators have a chance to make their voice heard during monthly meetings

PROGRAM DEVELOPMENT	Program development competencies include the skills required to assess and advance the project - from strategic planning to evaluation	Example of skill used by science association community manager	Example of skill used by research collaboration community manager
1 Strategy development	Develop, articulate, and document vision and mission. Conduct long-term planning and systems-level thinking related to organizational and community goals	Develop an ambassador program in order to scale community activities at a local level	Develop a strategy to engage members beyond the funding horizon of the collaboration
2 Analysis	Identify, track, and model patterns and trends to inform synthesis and decision-making	Use social network analysis software to determine which community members are connected and who are the central nodes in the community	Create a yearly network diagram of co-authored publications
3 Synthesis	Assemble qualitative and quantitative analyses into a cohesive framework for decision-making and strategic planning	Pull together metrics about declining logins, with feedback from the community about login issues to talk to the developers about a possible bug in the past week	Pull metrics on data collection efforts to inform planning for future research activities
4 Proposal development	Identify funding opportunities and coordinate program response	Submit budget request for next financial year to senior management including justification for new hires	Identify and share NSF's requests for proposals, and convene a team to coordinate a response
5 Advancement, growth and sustainability	Cultivate relationships with potential donors and sponsors to secure support. Leverage existing expertise, resources, or reputation to further community goals and impact	Discuss opportunities to fund a new sub-group within the community with foundation program managers	Meet with university's development officers to discuss priorities of key donors as they relate to the program
6 Advocacy	Promote the goals, achievements, needs, and value of the community to its current and potential participants and stakeholders and engender buy-in and participation in programs and initiatives	Represent the community at editorial meetings and suggest ways in which the organization can work with community members (e.g., by contacting members about interviews for an article)	Represent the collaboration at a statewide summit of citizen science practitioners
7 Program design	Create activities that meet mission, vision, and goals of the organization or community	Plan a series of blog interviews that give voice to under-represented community members	Plan a Research Experience for Undergraduates that leverages key research infrastructure and themes of the collaboration
8 Change management	Use understanding of organizational change to influence the adaptation of structures, processes, and practices to re-align an organization with a revised strategy or changed external context	Communicate to community members the decision to search index all community profiles	Work with researchers to implement new metadata standards for more effective collaboration
9 Recruitment, welcoming and onboarding	Identify, seek out, and cultivate new members and establish new partnerships and collaborations. Welcome and equip members for meaningful participation	Start and manage an "introduce yourself" thread that also contains links to online information about the community	Hold an icebreaker or networking event to connect new and prospective collaborators

COMMUNICATION	Communication competencies span a range of skills from planning, creating, editing, and delivering information - whether in written or meeting formats	Example of skill used by science association community manager	Example of skill used by research collaboration community manager
1 Content planning	Develop a strategy to establish effective themes, templates, and timelines for sharing content with community members and external audiences	Draft a content strategy around Black History Month	Outline key messages and schedule release dates for blog posts during a field expedition
2 Content creation and curation	Develop, source, and synthesize content including user-generated or original content. Update static content pages. Archive content	Identify guest bloggers and pre-schedule tweets and other social media updates	Create and publish a monthly e-newsletter
3 Editorial	Evaluate and modify content through selection, correction, condensation, and organization	Edit guest blog posts and order by similar topics to create mini-themes within the overarching series	Edit draft media release for scientific accuracy
4 Marketing and branding	Establish a community identity through consistent messaging, ranging from behavior to templates and logos. Promote programming, content, and events	Send community ambassadors running local groups high resolution logos with instructions of how to use them	Share high-resolution logos with collaborators, with instructions on when/where it is appropriate to use them
5 Knowledge brokering	Connect community members with sources of information, expertise, or experience	Introduce a new community member interested in outreach to an outreach coordinator in the community via email	Connect a first-year graduate student to a second-year graduate student to compare statistical methodologies
6 Media relations	Establish relationships with media representatives for dissemination of announcements and news items. Develop and write press releases and key messages	Write a press release about the millionth user joining the online community	Inform the university press office of an upcoming publication
7 Outreach	Strategic engagement with external audiences to disseminate knowledge, communicate messages, and deliver products and services	Moderate a public session at the annual meeting for local teachers to learn more about the association's activities in science education	Organize a public lecture at local museum by a collaborator
8 Speaking and presenting	Share and discuss the community's work, content, and outcomes in front of diverse audiences in a variety of settings	Give a presentation at the annual meeting introducing a new peer-mentoring program	Give a conference presentation on the importance of team coaching to successful collaboration with examples from the collaboration
9 Social media	Plan and share content on social media platforms, including adapting content and interactions to different platform norms	Tweet about new blog post about the community's activities, tagging featured community members who have Twitter accounts	Live-tweet during a conference presentation highlighting key research themes and accomplishments from the collaboration

TECHNICAL		Technical competencies span technical support to product management	Example of skill used by science association community manager	Example of skill used by research collaboration community manager
1	Media production	Create print, audio, or visual products to share information	Create a short video about the community's key activities for use at the marketing booth at the annual meeting	Create a short video of research highlights to play at the annual symposium for all members of the collaboration and representatives from funding organizations
2	Data analysis	Process, transform, and model data to discover useful information or draw conclusions	Look at how much storage space groups are using within the online community to project future storage requirements	Look at monthly data submission records to estimate sample processing time
3	Data visualization	Develop effective ways to display data to convey meaning for a range of audiences	Create an infographic about which countries community members come from	Create map illustrating geographic locations of collaboration partner organizations
4	Data management	Organize and curate data and associated metadata, maintain databases, and facilitate retrieval. Create, implement, and assure compliance with policies for ownership, access, and governance	Maintain secure database of community members' profile information and ensure that it conforms to privacy laws	Submit data to a long-term repository for backup
5	Systems administration and maintenance	Administer and maintain the community's technologies, platforms, and repositories	Ensure only association members can access association membership groups in the online community	Assign permissions to members of the collaboration for online access to different areas of the project
6	Product management of technology platforms	Compare and select community platforms, tools and technologies. Manage, improve, and optimize platform features. Identify new features to implement	Test and review a new third-party tool to determine features the current community platform may be lacking	Beta-test analysis tools prior to workflow integration
7	Web and UI design	Develop use cases and workflows to inform website layout	Create a decision matrix to inform how online menus are laid out	Create a data submission workflow and data entry form
8	Content Management System (CMS) administration	Develop new or adopt existing tools and templates that store, structure, and facilitate discovery of digital content	Create a tagging system for relevant content shared through the web site	Adopt a community-relevant tagging system for searching sample data sets
9	Technical support	Assist community members with adoption and use of community-supported technologies	Introduce a feedback button on the website so users can report technical problems more easily	Log in early for an online meeting to ensure that presenter can share their screen

Appendix 1

The 45 skills within the five core competencies of the CSCCE skills wheel. For each skill, we have listed an example of how it may be deployed in practice within a research collaboration or professional association context.