

BREAKOUT SESSION

Establishing an Emergency Medicine Education Research Network

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Abstract

This project was developed from the research network track at the 2012 *Academic Emergency Medicine* consensus conference on education research in emergency medicine (EM). Using a combination of consensus techniques, the modified Delphi method, and qualitative research methods, the authors describe multiple aspects of developing, implementing, managing, and growing an EM education research network. A total of 175 conference attendees and 24 small-group participants contributed to discussions regarding an education research network; participants were experts in research networks, education, and education research. This article summarizes relevant conference discussions and expert opinion for recommendations on the structure of an education research network, basic operational framework, site selection, leadership, subcommittees, guidelines for authorship, logistics, and measuring success while growing and maintaining the network.

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Education researchers face unique challenges in conducting well-designed studies to address educational hypotheses.^{1,2} Historically, these challenges have centered around education researchers (limited research experience and training), infrastructure (scarce funding, resources, and educational research infrastructure), and methodology (often single-site sample sizes inadequate for clinically and statistically meaningful results, plus difficulty measuring relevant outcomes).³ Scientifically sound education research requires use of rigorous study designs, appropriate theoretical frameworks, and meaningful outcomes.⁴⁻¹² Leaders in emergency medicine (EM) education have called for the development of an education research network to overcome these barriers, centralize expertise, pool resources, integrate the unique aspects of education research, promote collaboration, and catalyze high-quality scientific advances in education research.¹³

There are many benefits to network research, including multisite collaboration, larger sample sizes, faster enrollment, increased generalizability, rapid scientific and intellectual gains, cost efficiencies, and training opportunities. While EM researchers have become increasingly involved and invested in large national and international research networks, there currently is no existing EM education research network. One of the tracks at the 2012 *Academic Emergency Medicine* consensus conference "Education Research In Emergency Medicine: Opportunities, Challenges, and

Strategies for Success” was dedicated to using an interdisciplinary, consensus-based, and thoughtful approach to exploring and detailing such a research network.

In this article, we describe the consensus conference findings regarding development of an EM education research network for facilitating multicenter education research projects, fostering collaboration, and increasing synergy in education research initiatives. The framework for the network is separated into the four objectives used to guide discussion at the conference: 1) selecting a network structure to match resources, available funding, and goals; 2) developing the basic framework; 3) logistics—site selection, leadership, subcommittees, and equitable authorship; and 4) growth, maintenance, and measuring success.

METHODS

To develop the initial ideas for creating an education research network, we formed a committee of experienced EM educators, experts in network research and experts in education research to guide this track of the consensus conference. Investigators representing multiple EM research networks (Resuscitation Outcomes Consortium, Neurologic Emergencies Treatment Trials, Pediatric Emergency Care Applied Research Network, Pediatric Emergency Medicine Clinical Research Network, Western Emergency Services Translational Research Network) were included on the committee. We formed four subcommittees paired to each of the track objectives, with a facilitator to develop relevant ideas and guide content-specific small groups during the conference. To supplement this collective expertise, each facilitator conducted a literature search for papers describing the development of other research networks, related education research, and other relevant publications.

During the network breakout session we used a combination of consensus techniques, the modified Delphi method, and focus group qualitative research methods^{14,15} to collect and process ideas for creating an EM education research network. Participants in the session ($n = 24$) served as the consensus-building and focus group subjects. Focus groups were conducted using three to six attendees at a time, each led by an experienced facilitator. Each attendee rotated through all four small groups. During the focus groups, we transcribed notes and later reviewed the transcripts for key ideas, phrases, and recurrent themes.¹⁴ Focus group transcripts were evaluated by respective facilitators to assess the frequency of certain ideas, precipitating themes, and how recurring concepts fit into the four larger content domains.¹⁴ These findings were then reviewed and revised by other members of the writing group. To achieve consensus among the full group of conference attendees ($n = 175$), we posed two key questions to the group at the end of the conference with real-time electronic recording of answers to these questions. Results from the two questions are presented using descriptive statistics.

RESULTS

There were 175 attendees at the conference who participated in the overall consensus process and 24 attendees involved in the education research network breakout session with small groups. Findings from this track are summarized below, by small group objective.

Objective 1: Selecting a Network Structure to Match Resources, Available Funding, and Goals

Selecting a Network Structure. Selecting an appropriate research network structure is closely related to the availability of extramural grant funding. As part of the consensus conference, we presented three general types of EM research network structures, along with the pros and cons associated with each type of network (Table 1). Because dedicated funding for an education research network would not likely be available at the initiation of the network, attendees and experts agreed that starting with a voluntary, unfunded network structure (type 3 in Table 1) is most realistic. This type of structure does not require initial infrastructure grant funding and allows ample flexibility in the network. The challenges of a voluntary network include reliance on grass roots efforts and good faith among sites to get tasks done and studies completed, lack of a data coordinating center for administrative support, site attrition, the need to leverage other resources, and inherently less stability. If dedicated infrastructure funding is obtained in the future, the network structure may develop into a type 1 or 2 model.

Funding Challenges. There are unique funding challenges to education research, which are distinct from basic science and clinical research. Currently, most education research is conducted without extramural funding or grant support. Funding opportunities for education research are limited, tend to be modest in monetary amount, and often come from foundations, rather than federal sources. Education researchers commonly find themselves stalled in a pilot stage of research and have difficulty progressing to larger studies with more rigorous study designs necessary to compete for more substantive extramural grants. Many educational organizations do not offer research grants, while those that do often have very specific goals or questions linked to the funding. As grant funding is recognized as a critical aspect of performing rigorous, high-impact research, conference attendees recognized the need for continued efforts to identify, compete for, and secure extramural education research funding.¹⁶

Resources and Personnel. While funding for education research remains a challenge, research efforts in EM education are in a growth phase, with more local and national resources available than in the past. Several prior EM education research studies have used multisite study designs,^{17–20} demonstrating the feasibility of network-based education research and insight into the required resources. Many individual departments and institutions now offer pilot grants and other support for education research projects. Because opportunities for external education research funding are currently

Table 1
Different Types of EM Research Network Structures

<p>Type 1. Heavy infrastructure/personnel development, all internal funding.</p> <ul style="list-style-type: none"> • Heavy infrastructure funding, which may ultimately transition to per patient enrollment funding for sites. • All studies internally funded and rely on developed infrastructure. • Requires central data coordinating center. • Very specific content focus. • Primary focus is typically interventional randomized controlled trials. • Expensive, but stable if there is a committed funder(s). • Not a feasible structure for many networks. • Network dissolves with removal of funding.
<p>Type 2. Moderate infrastructure development, external funding for projects.</p> <ul style="list-style-type: none"> • Moderate maintenance funds for site infrastructure from primary funder(s). • All projects paid for with external grants (e.g., R01) using network infrastructure. • Requires central data coordinating center. • Content focused, but more flexible than above (type 1) networks. • Interventional and some observational studies. • Less expensive overall, but reliant on successful external grant awards.
<p>Type 3. Unfunded infrastructure, external funding for projects.</p> <ul style="list-style-type: none"> • Voluntary. • Reliant on grass roots efforts, good faith, leveraging of other grants, and existing departmental infrastructure. • Completely dependent on committed personnel and local champions. • No data coordinating center (may rotate depending on the project and lead site). • External grants only source of funding. • Very flexible for research content; mainly observational research. • Less stable, but financially highly efficient. • Network can continue indefinitely if there is member support and interest.

limited, departmental and institutional support will be particularly important when first initiating an education research network. Such support might include administrative assistance, methodologic guidance, and pilot funding for individual projects. Ideally, departmental arrangements could be negotiated for in-kind support (e.g., administrative staff, research assistants, and regulatory assistance) and protected time for key faculty to develop the network and pursue external funding. These recommendations are no different from strategies for developing researchers in noneducation fields and would likely be tied to specific time periods (e.g., 2 years), with an expectation of securing extramural grants and publications during the allotted time. Additional creative options for supporting the network

include leveraging other education research grants, using unfunded education projects to collect pilot data for future grant applications, matching funds from other programs, and further development of departmental education grant programs. There may also be opportunities for funding from hospitals or medical schools, particularly if an education research project is aligned with current institutional initiatives and requirements (e.g., core competencies/milestones evaluation, simulation, hospital safety, and quality programs).

Affiliating With an Outside Organization. Participants at the conference had extensive discussions about the benefits and limitations of affiliating a research network with a national organization. While there was no agreement regarding whether or not to pursue such a strategy, potential benefits include the ability to share the central resources (e.g., administrative support) of a larger organization, reach a broader audience, and capitalize on name recognition and credibility. Limitations include introducing conflicts of interest, the appearance of excluding certain groups of educators or learners, and the potential for alienating other organizations that might otherwise support the network. Participants did support the concept of having input and conceptual support from multiple national EM education organizations, provided that such support maintained a collegial and collaborative research spirit within the network.

Objective 2: Developing the Basic Framework

Participants, Leaders, and Stakeholders. A key aspect of ensuring the success of a research network is identifying a core, committed group of member sites, each with a key site principal investigator (site PI) willing to devote the necessary resources and energy to make the network operational and successful. Conference participants were consistent in their recommendation that each site have *one* invested faculty member to serve as site PI, local “champion,” and primary site contact in the development, implementation, growth, and maintenance processes of the network. The site PI might be a program director, assistant program director, chair, research director, vice chair, or other. This faculty member should ideally possess skills in leadership, administration, collaboration, medical education, and research, although it was recognized that a single individual may not possess all of these traits. While expertise in research methodology is beneficial, it is not required, as these skills may be learned or accessed through network collaborations. Conference participants felt that having a single individual as site PI was important for simplifying network communication, assuring accountability, and coordinating site-specific participation. However, participants also recommended development of a local education research “team” (e.g., three to four faculty members, including the site PI) at each site, including key faculty who control access to study subjects/learners (e.g., medical students, residents, fellows). Suggested members of the site research team include the residency program director, medical student clerkship director, fellowship director(s), and director of simulation, although other faculty may be appropriate, depending on the site.

Other important stakeholders should be systematically identified at each participating institution. These individuals might include EM and non-EM faculty interested in medical education research, education fellows, faculty with expertise in research and related skills (e.g., qualitative and quantitative research methodologies, grant writing, involvement in other research networks), department chairs, program directors, medical school leadership (e.g., associate dean of Graduate Medical Education), nursing school leadership, and research leaders at a given institution (e.g., associate dean of research, PI for clinical and translational science institute, research center directors, and PIs for existing education research grants). Although these stakeholders may not be part of each site's core team, they should be contacted and periodically updated as to progress in the network to increase involvement and open future research opportunities.

Administrative Issues and Tasks: Dividing and Conquering. There are many administrative tasks associated with a research network. These include communication, regular updates on network progress, developing and maintaining a website, promoting the network to other organizations, budgets, subcontracts, data use agreements, institutional review board (IRB) applications, and other administrative aspects of building network infrastructure and initiating projects. While networks with infrastructure funding typically centralize these tasks in a data coordinating center, a voluntary education research network would likely distribute these tasks over participating sites or concentrate in two or three lead sites. Conference participants favored equitable distribution of tasks, particularly if they are defined in advance and assigned at the start of the network. However, participants acknowledged that equal distribution of tasks among sites has limitations, as individual sites may lack the resources or capability to follow-through on assigned tasks. Another suggestion for sharing the administrative responsibilities included requiring certain administrative tasks as site "buy-in" to the network. Other voluntary networks have used two or three primary sites to shoulder the administrative responsibilities of the network, with preference to these sites for initiating and leading the initial projects. Project-specific administrative tasks will be borne by the primary site initiating and leading a given project.

Participants consistently mentioned the importance of regular communication among network sites. Regular (e.g., monthly) conference calls were considered critical to maintain awareness of the network, ensure accountability, catalyze collaboration, and develop research ideas. As with other networks, in-person meetings can occur at convenient times and locations, corresponding with other regularly attended meetings. Several participants also suggested obtaining a planning grant during early development of the network to support an initial face-to-face meeting devoted to site selection, introducing network PIs, making key network decisions, developing a research agenda, forming subcommittees, agreeing on network priorities, and outlining plans for the initial studies. A similar strategy

has been successfully employed by other research networks.

Regulatory and IRB Issues. An important aspect of any research network pertains to regulatory issues, including IRB applications, continuing reviews, data use agreements, subcontracts, and Federalwide Assurances (for projects using federal funding). For an education research network, these tasks are likely to be project-specific and the responsibility of the lead site for a given project. However, the initial project(s) may entail more extensive contract development that could be recycled or retained for subsequent projects. Individual sites will be required to handle local IRB submissions and other local regulatory requirements. Creating a network regulatory subcommittee (discussed below) can be helpful in working through related human subjects issues (e.g., consent), how a protocol might be interpreted by IRBs, and developing the necessary documents for IRB submissions. While the concept of a centralized IRB continues to be discussed in other networks, this has yet to be realized on a broad scale. However, having the lead site for each project assume responsibility for developing and submitting the primary IRB application and securing the initial IRB approval document can speed the review process at other sites.

Objective 3: Logistics—Site Selection, Leadership, Subcommittees, and Equitable Authorship Guidelines

Selecting Network Sites. Conference participants agreed that there should be site-specific requirements for network participation. Several basic requirements were suggested:

- A dedicated site PI and committed group of core investigators (the research "team");
- Value-added resources (e.g., research assistants, administrative staff with expertise in budgets, and subcontracts);
- Access to a group of learners (e.g., residents, medical students, nursing students, paramedic students, etc.); and
- Departmental support (e.g., protected time for key faculty, administrative support, dedicated access to learner groups, and promotion of partnerships within the institution) formally recognized through a letter from the chair.

Participants also suggested considering different tiers of site participation (Table 2), with an option for satellite sites becoming primary sites after meeting prespecified criteria.

The Steering Committee. A primary leadership group is critical to effectively navigate issues facing the network and to make decisions on behalf of the network. A steering committee can serve this function, with representation from each participating site (typically the site PI serving as the single voting representative per site). Other major stakeholders or funding agencies might also be represented on the steering committee, depending on their involvement in the network.

Table 2
Potential Tiers for Sites Participating in an Education Research Network

<p>Level I: Core sites (steering committee members) Each core site would be required to</p> <ul style="list-style-type: none"> • Have a dedicated site primary investigator (PI). • A committed education research team. • More involvement with the network, plus responsibility for developing, growing, and sustaining the network; Level I sites will serve as leaders within the network. • Research experience, grant funding, education fellowship programs, institutional support, and the ability to lead and mentor other sites. • Expected to participate in most, if not all, network studies and to shoulder a larger administrative burden for the network. • Target size of 9 to 15 members, with an odd number ideal for voting purposes. <p>Level II: Affiliated satellite sites Each affiliated site would be required to have one core faculty member (site PI) and would have more flexibility in study participation.</p> <ul style="list-style-type: none"> • Would not have primary voting privileges on the steering committee and may only come into the network for certain projects. • May not have access to multiple learner groups, although should bring interest, resources, opportunity for growth, and added value to the network. • Will be mentored by the Level I sites to increase their skills and resources, ideally progressing to Level I core site status as their research activities increase.
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The number of steering committee members should be manageable and ideally an odd number (9 to 15) for decisive voting on complex issues. The steering committee will act as the primary governing body of the network and will adhere to bylaws outlining its purpose, structure, membership, policies, procedures, and code of ethics. The steering committee may be responsible for reviewing and approving specific research proposals, determining the number and type of studies that can be run concurrently, and study priority. This group will also be charged with formulating and monitoring policies for the network, resolving disputes, making major network decisions, evaluating new sites, and generally guiding the growth and sustainability of the network.

Subcommittees. Subcommittees also serve a critical role in a research network. These groups typically carry out specific network tasks and advise the steering committee. Based on structures successfully used in other EM research networks,²¹ multiple potential subcommittees were proposed for an education research network (Table 3).

Grant Submissions. The pursuit of extramural grants is critical to the survival and growth of a research network, as external funding provides the opportunity to conduct broad and rigorous research. For extramural

grant submissions, individual site PIs (and other members of participating sites) will generally be responsible for developing research ideas and grant applications. However, ideas should be developed with the insight and approval of the steering committee and finance subcommittee to assure appropriate resource allocation, budget estimates, and compatibility with the network research agenda. Individual grants will generally be submitted and run through the PI's institution. Non-member investigators interested in using the network infrastructure for research grants may have the opportunity after approval by the steering committee. Potential options for funding medical education research are detailed in a separate article in this issue.¹⁶

Establishing a Research Agenda and Prioritizing Studies. Developing a research agenda is a critical aspect of a research network. This process should be led by the steering committee at the outset of the network. One option for developing the initial research agenda is hosting a face-to-face summit meeting at the inception of the network. After reviewing the list of research priorities from the consensus conference, other education research priorities, a catalog of site resources, and feasibility assessment, steering committee members should consider ranking the list of research priorities and developing the network research agenda. The steering committee can use the resulting research agenda and list of priorities as a guiding document for study selection, prioritization, and network goals. These research priorities should be revisited on a regular basis (e.g., every 2 years) to assure that network activities and projects are high-yield and matched to the greatest education research needs and opportunities.

Guidelines for Publication and Authorship. While the International Committee of Medical Journal Editors specifies criteria for authorship,²² research networks have unique considerations. By the nature of multisite research, networks have a large number of people involved in research projects, creating challenges in determining equitable authorship guidelines. There are published guidelines for group authorship,^{23,24} and many journals have their own guidelines for network-based authorship.

There are several principles to be considered when developing author guidelines for the network. First, each site participating in a given study (i.e., contributing study subjects and data) should have representation on writing groups for resulting manuscripts. Based on experience from other networks, specifying one to two authors per site for a given writing group is a reasonable target. In general, manuscripts with more than 15 authors are difficult to manage and should be discouraged; ideally papers would have no more than 10 authors. Exceptions may be considered for particularly rigorous, high-impact, or otherwise logistically complicated studies involving a large number of persons and sites. Individuals contributing to a project, but not meeting authorship criteria, should be listed in the acknowledgments section of resulting manuscripts. Finally, special authorship consideration should be given for trainees (e.g., residents, fellows, junior faculty)

Table 3
Suggested Network Subcommittees

<ol style="list-style-type: none"> 1. <i>Protocol review and development</i>: Reviews, makes recommendations for and helps develop research ideas, concepts, content and protocols endorsed by the steering committee. 2. <i>Regulatory</i>: Establishes network guidelines for ethical issues associated with education research and assists PIs with networkwide IRB proposal preparations and submissions. 3. <i>Quality assurance (aka study monitoring)</i>: Ensures that research protocol design, development, and implementation are in compliance with accepted standards for protecting human subjects, rigorous research practices, and valid and reliable data collection. Such a subcommittee might also monitor individual sites for compliance with protocols, data quality, and timeliness. 4. <i>Data analysis and management</i>: Assures quality in data management activities, facilitates the exchange of information, provides insight and guidance on database development, data dictionaries, and other issues central to high-quality data collection and management within the network. This subcommittee may also coordinate development of a network data registry. 5. <i>Publication</i>: Sets, monitors, and enforces policies regarding authorship and presentation of network research results and arbitrates authorship decisions. This subcommittee will assist with development of project writing groups, ensure fair and equitable representation in writing groups, and monitor timeliness and progress with resulting abstracts and manuscripts. In addition, this subcommittee will determine policies (in conjunction with the steering committee) for who owns data generated from network studies and the process for using the data for secondary analyses and/or publications not initially proposed. 6. <i>Financial (feasibility and budget)</i>: Ensures that research studies and grant submissions are feasible for the network and are sufficiently funded. This subcommittee can also help to procure potential sources of funding and ensure appropriate distribution of funds to participant sites. Most importantly, this committee ensures that grant submissions are appropriately resourced for the science proposed, as one of the risks to network research is having a grant funded, but insufficiently resourced for the proposed work. 7. <i>Professional development</i>: Provides ongoing faculty development within the network for participating sites, including trainees. Faculty development may include opportunities to enhance research skills, share curricula, and use peer mentorship to further develop the education research workforce. This committee might also coordinate webinars and online modules to carry out their tasks, plus help members identify areas for educational scholarship.
<p>IRB = institutional research board; PI = primary investigator.</p>

integrally involved in certain research studies to encourage the involvement of and reward for young investigators. There may be a provision for up to three authors from a given site if trainees mentored by network faculty have been involved in the project.

Another consideration for projects with a large number of investigators is corporate authorship, whereby the author is the network (no individual names listed on the author byline of the publication) with individuals being listed in a group acknowledgment section at the end of the article.²³ This practice is becoming increasingly common. Guidelines for publication and authorship should be developed by the publications committee shortly after forming the network and before initiating the first project. Author guidelines should strive to be inclusive, equitable, and transparent and to recognize individuals for the work done.

Finally, standardized methods for reporting in publications should be agreed on by the network. Because there are a wide range of study designs and methodologies used in medical education research, adherence to accepted standards for reporting results will help establish the credibility of the network and associated publications. These standards should be compiled by the publications committee. Current standards of quality for quantitative medical education research and general clinical research have been established.^{1,25}

Objective 4: Growth, Maintenance, and Measuring Success

Growing and Maintaining the Network. Growth of the network will depend to a large extent on securing extramural funding, publishing rigorous science, and addressing key education research questions. The

growth process also requires effective leadership (the steering committee) and truly dedicated site investigators. Participants at the consensus conference identified and reiterated several key factors in growing and maintaining the network:

- Defining and adhering to a mission (including the research agenda);
- Effective leadership (steering committee);
- Effective methods for communication (e.g., RedCap, Google docs, webinars, conference calls, newsletters);
- Selecting projects with the potential for extramural funding and network growth;
- Monitoring and meeting metrics for success (evaluated annually or more frequently);
- Productivity and publications;
- Integrating opportunities for trainees and young investigators; and
- Developing the social fabric of the group through regular communication and celebrating network victories.

Opportunities for Trainees (Fellows, Residents, Junior Faculty). With development of an education research network, opportunities for trainees and young investigators can be integrated into the network. This strategy allows future growth of the network by training the next generation of education investigators. Other research networks integrating opportunities for trainees have described the importance of mentorship, supportive research environments, strong leadership, and seminars to help develop young investigators.²⁶ Aligning an education research network with development of future investigators in education research would also allow for shared resources (e.g., curricula,

research exposure, authorship, and mentorship) to further propel advances in the field.

Measuring Success of the Network. Success in a research network is measured by demonstrated productivity, growth, and maturation. Benchmarks and goals should be set early in network development and periodically evaluated. Potential metrics (direct and indirect) for measuring success in an EM education research network are listed in Table 4. One key indirect measure that will be watched closely among education and non-education investigators is the rigor and methodologic quality of network research.²⁷ The network must also ultimately find ways to tie quality medical education to quality clinical care through measurement of patient-level outcomes to remain relevant in an increasingly cost-constrained and competitive environment.

CONSENSUS QUESTIONS

While objectives 1 through 4 focused on the development and details of creating an education research network, we also assessed more global questions about the timing and focus of such a network. Two key questions were posed to the full group ($n = 175$), including:

- Should an EM education research network be developed now, regardless of available funding and resource constraints?
- If an EM education research network is established, should it focus on a particular education issue or allow multiple different education content areas to be pursued?

Table 4
Potential Metrics for Measuring Success in an EM Education Research Network

Direct
<ul style="list-style-type: none"> • Number of institutions/sites in the network and attrition • Number of external organizations affiliated with the network • High priority studies and research questions completed • Number of peer-reviewed publications, abstracts, and regional/national presentations • Number of research subjects recruited to studies • Number and type of extramural grants • Development and mentoring of medical education researchers and young investigators
Indirect
<ul style="list-style-type: none"> • Methodologic quality of network studies • Degree of collaboration within EM and other specialties • Collaboration with other research networks • Network as a potential catalyst for other education research efforts • Integration to institutional research circles • Integration/translation of network research into educational programs and patient care • Improved communication among educators • Integration of evidence-based practices to education • Number of education fellowships with formal research or graduate degree requirements

In response to the first question, 90% of respondents voted in favor of developing an education research network. For the second question, 79% supported studying multiple areas of education research, rather than a more focused approach to education content.

CONCLUSIONS

Among participants at the 2012 *AEM* consensus conference on education research, there was broad support for developing an EM education research network to study multiple education topics. We describe the framework and details for developing, implementing, managing, and growing such a network. Considering the current funding challenges in education research, an education research network would likely begin as a voluntary network, reliant on member sites to handle administrative tasks, communication, and growth using existing resources. However, there is a sense of urgency in addressing key education research questions, and the benefits of multisite education research were felt to outweigh the inherent challenges. This article provides a consensus-driven template for creating such a network, including the basic framework, site selection, leadership, subcommittees, guidelines for authorship, logistics, and metrics for measuring network growth and success.

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