The Work and Complications of Hub Leadership in Educational Improvement Networks

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This white paper is an inquiry into educational improvement networks as a novel organizational form in which central "hub" organizations collaborate with members to improve the quality of (and to reduce disparities in) students' educational opportunities, experiences, and outcomes. These networks always operate in the context of public school districts, and potentially in lieu of district central offices in advancing improvement initiatives.

The paper focuses specifically on the leaders of hub organizations. Hub leaders bear primary responsibility and accountability for establishing, managing, and sustaining educational improvement networks in ways that advance educational excellence and equity. Even so, hub leadership has functioned as something of a "black box" among proponents of educational improvement networks, with capabilities for hub leadership a tacit and unexamined assumption on which the network movement has been predicated.

The purpose this inquiry is to peer inside that black box to examine a) the work of hub leaders, b) the conditions that complicate their work, and c) ways in which they manage those complications. Our ambition is for this white paper to be useful in advancing the assessment and evaluation of network leadership, research on network leadership, and professional learning opportunities for network leaders. The paper is structured as follows:

- We motivate and frame our analysis with a discussion of relationships among the broader education reform landscape, educational improvement networks, and hub leadership.
- We detail our design for studying the work and complicating conditions of hub leadership.
- We present our findings and interpretations.
- We discuss our findings in relation to the ambitions sketched above.
- We conclude with reflections the primary takeaways from all of the preceding.

Peering into the black box of hub leadership, one primary takeaway is that the work of hub leaders is more expansive, more complex, and yet more weakly supported than is commonly recognized. That, in turn, implies a need for urgency in continuing to assess, study, and support hub leadership. Peering more deeply, a second primary takeaway is that the pursuit of educational excellence and equity may hinge on the integration of improvement efforts in public school districts and in educational improvement networks, and on coordinating the advancement of instructionally-focused education systems and scientific-professional learning communities. Establishing a vision for that integration, in turn, becomes the next step down that path.

Motivating and Framing Our Inquiry

Educational improvement networks operate in complex contexts. Societal ambitions for excellence and equity in US public education are pressing public school districts to disrupt and transform institutionalized (and dysfunctional) approaches to organizing and managing their core work: classroom instruction. They are also driving the emergence of educational improvement networks as an organizational form that has potential to contribute unique value to the advancement of excellence and equity. Even so, realizing that potential hinges on developing a new cadre of network leaders capable of establishing, managing, and sustaining them.

That, in turn, creates a need to understand the practice of network leaders: their core, day-to-day work. It also creates a need to understand ways in which the historical and contemporary contexts of US public education shape, support, and complicate their work.

Excellence, Equity, and the Press for Transformation

Our examination of educational improvement networks builds on an interpretation of the broader educational reform landscape developed in a program of theory building research on instructional improvement centered in six diverse education enterprises (Cohen, Spillane, &

Peurach, 2016; Peurach, Cohen, Yurkofsky, & Spillane, 2019; Peurach, Cohen, & Spillane, 2019; Peurach, Yurkofsky, Blaushild, Spillane, & Sutherland, in press).

By this interpretation, among the primary developments in broader educational reform landscape over the past half century has been expanding societal ambitions for public education: beyond universal access to mass public schooling to excellence and equity in students' educational opportunities, experiences, and outcomes once in schools. These expanding, sustained societal ambitions have found expression in such policy logics and movements as standards-based reform, evidence-driven improvement, markets and choice, teacher professionalism, and democratic localism.

On their own, each of these policy logics and movements has contributed to locating and sustaining excellence and equity squarely on the national education reform agenda. Together, these policy logics and movements exist more as a stew of ideologies, priorities, and imperatives, absent intentional coordination. Some are synergistic. Some are conflicting. All are products of (advanced through) famously fragmented, incoherent US educational environments spanning the national, federal, state, and local levels.

Expanding, sustained societal ambitions and policy presses for excellence and equity have created a press for alternatives to conventional public school districts: for example, state takeover districts, turnaround zones, and charter school networks. They have also created a press on districts to disrupt and transform deeply institutionalized approaches to the organization and management of instruction, with the aim of increasing quality and reducing disparities in students' educational opportunities, experiences, and outcomes. After all, that is where students either rise together or grow farther apart: in the thousands of hours that they spend with each

other and with their teachers in classrooms, as they progress over 13 years from kindergarten to graduation.

Yet, as the primary engines of access-oriented mass public schooling, a ubiquitous and deeply-institutionalized pattern of instructional organization and management has long had many districts doing little more than sorting students into schools, classrooms, academic tracks, and supplementary instructional venues; resourcing those venues with teachers, curricula, and supporting instructional resources; and delegating to teachers primary responsibility for organizing and managing their day-to-day work with the students assigned to them using the resources afforded them.

One result was as a "loose coupling" between the formal structure of central offices and schools and the behavioral structure of teachers and students in classrooms. Another was a key locus of structural inequality: weaknesses and inequities in educational opportunities, experiences, and outcomes for students of poverty and color, many of whom were sorted and segregated into schools and classrooms that were simultaneously under-resourced and incoherently-resourced and in which they engaged in rote, low-level instruction.

Amidst expanding, sustained ambitions for excellence and equity, districts are being pressed to transform themselves into instructionally-focused education systems in which central office and school leaders collaborate with teachers to organize and manage their day-to-day work with students. While some districts are buffering this press and holding tight to the status quo, others are heeding it in earnest.

Among districts heeding the press, one effect has been deeper engagement by central offices and schools in new domains of work: for example, building educational infrastructure and supporting its use by teachers and students in classrooms; managing performance for

improvement and accountability; developing and distributing instructional leadership; and managing all of the preceding in relation to the expectations, resources, and requirements in their environments.

As detailed in Appendix A, another effect has been to replace homogeneity with variety in the organization and management of instruction, with the emergence of new types of instructionally-focused education systems characterized by different patterns in the distribution and coordination of this work among central offices and schools, different underlying theories of action, and different associated design principles. These include managerial education systems, market-driven education systems, federated education systems, and networked education systems.

All of this is more "work in progress" than fait accompli, with potential solutions coexisting with legacy dysfunction. Broader society continues to press for public schools not just to house students but, also, to ensure that all of them actually learn ambitious academic content at the same high standards. Policy logics and movements pressing for excellence and equity continue to evolve in more-or-less coordination. And districts continue to buffer and embrace the press to transform they ways that they organize and manage their core educational function: classroom instruction.

To anchor this interpretation more concretely and immediately, its fundamental dimensions can be used to frame the educational crises brought on with the onset of the COVID-19 pandemic in early 2020. From the front pages of national newspapers to micro-blogs on social media, one sees clear expression of societal concern not only with universal access to mass schooling in the form of online learning but, also, with the quality of (and disparities in) students' educational opportunities, experiences, and outcomes as they gain access. These

concerns, in turn, are pressing districts not only to serve as engines of mass schooling that afford universal access to online learning via the distribution of computing devices and the establishment of WiFi hubs. They are also pressing districts to rapidly transform themselves into instructionally-focused education systems in which central offices, schools, and teachers collaborate to organize and manage instruction in the online space in ways heedful of societal ambitions for excellence and equity.

Educational Improvement Networks

Educational improvement networks are emerging and operating as a novel organizational form from-and-in this broader educational reform landscape. For purposes of this analysis, we examine this organizational form as one in which a central, "hub" organization collaborates with members to improve the quality of (and to reduce disparities in) students' educational opportunities, experiences, and outcomes. Within this general form, the specifics of educational improvement networks can vary dramatically. For example, educational improvement networks can span the schools, districts, and states that make up the formal K-12 governance structure, or they can operate as special projects within the formal K-12 governance structure. Hubs can range from project teams in established organizations (e.g., universities, non-governmental organizations, districts, and states) to independent non-profit and for-profit organizations. Members can range from individuals teachers and leaders to entire schools and districts.

Examples of educational improvement networks that are structured and that operate in these ways include networked improvement communities (e.g., the Central Valley Networked Improvement Community); certain forms of research-practice partnerships (e.g., as advanced by the SERP Institute and the National Center on Scaling Up Effective Schools); some district-based and state-based improvement initiatives (e.g., the Tennessee Early Literacy Network); and

some non-governmental improvement initiatives (e.g., Reading Apprenticeship, Reading Recovery, and Success for All).

The fundamental ties that bind hub organizations and members into educational improvement network are shared aspirations and commitments to develop and operate as distributed "learning systems" that improve educational quality (and reduce disparities) at a large scale by using formal processes of collaborative, continuous improvement to produce, use, and manage practical knowledge. Indeed, researchers have described networks functioning as "epistemic community" in which processes of evolutionary support the production, use, and refinement of theory, code and language, and tools and routines that support effective practice across space and time (Glazer & Peurach, 2015; Peurach & Glazer, 2016).

Researchers have also described networks functioning as "scientific-professional learning communities" that embody norms of analysis and empiricism; engage research evidence; produce and leverage a shared, accumulating practical knowledge base; and support knowledge diffusion to support network aims (Russell et al., 2017, 2019). Educational improvement networks that function as scientific-professional learning communities are characterized by:

- An explicit focus on understanding and improving the practice — the collaborative, day-to-day work — of students, teachers, and other educational professionals responsible for students' development and well-being.
- Technical capacities and capabilities supporting the development and refinement of a theory of practice improvement, the use of formal improvement research methods, and the development and use of a measurement and analytics infrastructure.
- A social organization in which membership, participation and engagement, relational trust, and social connections are supported and reinforced by a shared narrative, norms of participation, an evidence based culture, and new identification with the network and its aims.

Structured and operating in these ways, educational improvement networks are democratic, in that they co-engage hubs and members as equal partners in establishing and

pursuing common agendas for improvement. They are pragmatic, in that the return on these partnerships is a practical knowledge base that supports hubs and members in working in new, more effective, more coordinated ways to support students' personal and academic development. They have potential to add value to other improvement activity in schools and districts, or to function in lieu of other improvement activity.

Structured and operating in these ways, educational improvement networks also compensate for weak, macro-level mechanisms for producing and using practical knowledge for educational improvement, both in the academy and in the professions. [Say more about the lack of macro-level educational infrastructure of the sort described by Peurach et al. (2019) as missing in the US.]

If the fundamental ties that bind hubs and members are shared aspirations and commitments to develop as democratic, pragmatic scientific-professional learning communities, one fundamental complication that risks loosening those ties is that educational improvement networks are not part of the institutionalized organizational landscape of public education. Rather, they operate between-and-across the structures and boundaries of institutionalized educational organizations, often as newly-constituted hub organizations and newly-established member teams.

Indeed, many educational improvement networks operate as what organizational scholars describe as "temporary organizations" (Bakker, 2010; Burke & Morley, 2016; Kenis, Janowicz-Panjaitan, & Cambre, 2009; Lundin and Söderholm, 1995; Schubler, 2017). Such organizations are characterized by newly-established relationships among collaborating teams or organizations that share responsibility for defined projects, tasks, and objectives and, thus, have formal structure, social structure, and technical capabilities. These collaborations are typically for pre-

determined periods of time, though sometimes with the possibilities of extension. And they typically are premised on the expectation that the work of the temporary organization will ultimately effect change in or contribute value to the "permanent organizations" in which collaborators are situated. With that, temporary organizations often involve at-will relationships; have responsibilities and capabilities outside of the routine workflow of these permanent organizations; and depend on funding outside of conventional resources flows in these permanent organizations.

Challenges to the aspirations and commitments of educational improvement networks lie not only in the status of networks, hubs, and members as temporary organizations. They also lie in variably-developed "innovation infrastructure" in US educational environments, and in the approaches to educational innovation and improvement supported (and not supported) by this innovation infrastructure (Peurach, 2016; Peurach & Foster, 2019; Peurach, Penuel, & Russell, 2018).

Since World War II, US educational environments have evolved to feature highly developed, deeply institutionalized innovation infrastructure supporting a "resource-based" approach to educational innovation and improvement, one that aims to improve advance educational excellence and equity by increasing the quality of educational resources, ensuring their equitably distribution among districts and schools, evaluating their impact on outcomes of interest, and holding both resource-providers and resource-users accountable for outcomes. Yet, ironically, this resource-based approach to educational innovation and improvement continues to reinforce status-quo approaches to organizing and managing instruction in central offices, schools, and classrooms via processes of sorting, resourcing, and delegating — again, one key locus of structural inequality.

By contrast, robust innovation infrastructure supporting the type of practice-based innovation and improvement characteristic of educational improvement networks has yet to emerge. As a consequence, educational improvement networks emerge and operate in educational environments lacking essential resource endowments, proprietary activity, institutional arrangements, and market functions. Emerging and operating in educational environments in which the dominant innovation infrastructure reinforces the status quo, the risk runs high of a sort of "ritualized rationality": a compliance-oriented engagement in which members devise improvement-focused roles and structures, appropriate improvement language, and enact prescribed improvement processes, though without coupling improvement activity with day-to-day work in classrooms (Peurach, Penuel, & Russell, 2018).

By this analysis, while educational improvement networks exist because of their environments, they must succeed despite their environments.

Network Leadership

Responsibility for realizing the potential and managing the complications of educational improvement networks rests with network leaders distributed among the hub organization and its members. Working in collaboration, hub and member leaders share responsibility for moving their organizations and teams beyond the types of "in-principle" collaborators described in memoranda of understanding to collaborators in developing and managing complex, distributed learning systems.

For purposes of this analysis, we focus specifically on the leadership of the hub organization. Hub leaders are the linchpin of educational improvement networks. It is on the desks of hub leaders that the buck stops. Hub leaders have responsibility (and are accountable) for creating and managing the hub organization that creates and manages the network in which

increasing numbers of members collaborate to improve the quality of (reduce disparities in) students' educational opportunities, experiences, and outcomes. The conjecture on which our analysis is premised is that, if hub leaders succeed in bringing networks into existence, developing and coordinating capabilities for collaborative learning, and sustaining these enterprises over time, the potential to improve educational quality (and to reduce educational disparities) increases. The corollary conjecture is that, if hub leaders struggle along any or all of these dimensions, the potential decreases.

There is much in the preceding analysis to suggest remarkable complexity in the work of hub leaders. For example, the preceding analysis would have hub leaders collaborating with members to develop and manage the practice focus, technical capabilities, and social organization that characterize scientific-professional learning communities. It would have them collaborating with member leaders to develop and administer the network as an organization; to manage relationships with the "permanent" organizations in which hubs and members reside; and to manage relationships with communities, constituents, resource providers, and policymaking organizations in broader educational environments. And it would have them doing all of this in pursuit of multiple, interdependent aims, including establishing and maintaining the identity and legitimacy of the network; developing and scaling up new ways of working among growing numbers of members; effecting and demonstrating meaningful impact on outcomes of interest; contributing new value to their permanent organizations; and sustaining the network for the time needed to accomplish all of the preceding.

There is also much to suggest that this is work that is categorically different from conventional educational administration/leadership within the state agencies, district central offices, and schools that make up the formal K-12 governance system. These are permanent

organizations that take conventional, hierarchical, bureaucratic organizational form; that are widely recognized as legitimate; and that are supported by institutionalized funding streams. They feature established role structures and career paths: principals, superintendents, and their assistants and associates. That role structure is supported by loci of pre-professional preparation and ongoing professional development as institutionalized in colleges, universities, and professional associations, all coordinated through professional standards for preparation, certification, practice, and program accreditation institutionalized in national policy frameworks and in state policy. All of the preceding are informed by traditions of educational research that are, themselves, institutionalized: the American Educational Research Association (Division A – Administration, Organization, and Leadership), the University Council for Educational Administration, and the International Council of Professors of Educational Leadership. And all are evolving to move beyond supporting the administration of mass public schooling to supporting the organization and management of instructionally-focused education systems.

By contrast, hub leaders, again, work in temporary organizations in reciprocal relationships and premised on principles of democratic and pragmatic engagement, absent institutionalized lines of authority and power, absent widespread recognition and legitimacy, and absent institutionalized funding. Their role structures are constructed and re-constructed ad hoc, absent institutionalized loci of professional preparation and development, absent standards of program accreditation, and absent professional standards of preparation, certifications, and practice. And it plays out absent established lines of research seeking to conceptualize it, theorize about it, or support it.

This is not to argue a vacuum in the support for hub leaders. For example, an online, open access micro-credentialing program in *Leading Educational Innovation and Improvement* was

designed jointly by the University of Michigan and the Carnegie Foundation for the Advancement of Teaching to provide introductory-level preparation for aspiring hub and network leaders, and the annual Carnegie Improvement Summit functions as a further locus of professional identification and professional development. Moreover, a constellation of other champions of educational improvement networks also provide (or have provided) opportunities and resources for professional identification, preparation, and practice, including the SERP Institute, the Research + Practice Collaboratory, the National Center on Scaling Up Effective Schools, and the National Network of Education Research-Practice Partnerships.

Yet these, too, are initiatives that operate outside the institutionalized K-12 public education system, and function as exceptions that prove the rule: Hub leaders lack the institutionalized identities, resources, and supports of conventional educational leaders operating within the K-12 public education enterprise.

Indeed, on the point of the research base of hub leadership, a broad search using the keywords “education”, “network”, and “leadership” in Google Scholar yielded a single article (among the first fifty) focused on hub leadership in educational improvement networks of the sort framed above (Martin & Gobstein, 2015). The article is a self-report of two hub leaders focused on identifying leadership structures and practices in a large, national educational improvement network, including convening the network, establishing a membership framework and participation structures, building leadership and hub functions, developing a communications infrastructure, and finding necessary resources.

Though readily-identifiable lines of research have not yet emerged, a small literature on hub leadership has been developing beyond the bounds of a straightforward search of Google Scholar, in a mix of articles, foundation reports, and books. This literature includes efforts to:

- Build support for (and frame) a research agenda examining the practice, knowledge base, and professional learning of hub leaders (Peurach & Gumus, 2011).
- Identify "lessons learned" about the practice and learning of hub leaders in adapting networks to changing policy standards for performance (Duff et. al, 2019).
- Elaborate and measure key dimensions of the practice of hub leadership (Russell et. al, 2019.
- Structure support for the practice (and the practice-based learning) of hub leaders in developing networks as learning systems (Glazer & Peurach, 2019; Peurach, 2016; Peurach & Glazer, 2018; Peurach, Glazer, & Lenhoff, 2016; Peurach, Lenhoff, & Glazer, 2016; Sherer et. al, 2019).
- Integrate theory, research, and practical guidance to support the work of hub leaders (Bryk, forthcoming; Bryk et al., 2015; Crow, Hinnant-Crawford, & Spaulding, 2019; Penuel & Gallagher, 2017).
- Strengthen macro-level supports for hub leadership by advocating for and supporting field-building initiatives (Penuel et al., in press; Peurach, 2016; Peurach, Penuel, & Russell, 2018; Peurach, Russell, Cohen-Vogel, & Penuel, forthcoming).

This small, emerging literature features several empirical studies of hub leadership. For example, resources cited immediately above include a self-report of hub leaders about key dimensions of practice (Martin & Gobstein, 2015); a report of "lessons learned" about the practice of leaders in responding to environmental change (Duff et al., 2019); reports on efforts to support the practice-based learning of hub leaders (Glazer & Peurach, 2019; Peurach, 2016; Peurach & Glazer, 2018; Peurach, Lenhoff, & Glazer, 2016); and reports on leadership in exemplary educational improvement networks (Bryk, forthcoming).

Yet, in the main, much of this literature is conceptual, and works from a combination of scholarship, analysis, and field experience to frame essential dimensions of the practice of hub leadership; knowledge, capabilities, and dispositions of hub leaders; approaches to the professional learning and development of hub leaders; and approaches for strengthening macro-level/field-level support for hub leadership.

Questions for Further Study

By the preceding analysis, educational improvement networks are a novel organizational form emerging and operating in a dynamic educational reform landscape, one in which increasing, sustained pressure for (and pursuit of) educational excellence and equity are playing out amidst legacy dysfunction that complicate these efforts and that reinforce the status quo. Enthusiasm for educational improvement networks lies in their potential to function as pragmatic, democratic learning systems that support the production, use, and refinement of knowledge needed to improve (and to reduce disparities in) students' educational opportunities, experiences, and outcomes at a large scale.

Realizing the potential and managing the complications of educational improvement networks to function as value-added contributors to efforts to advance equity and excellence rests on the shoulders of hub leaders. Even so, understanding of (and support for) hub leadership is weak as compared to both a) the apparent (and remarkable) complexity of their work and b) institutionalized supports for conventional educational administration/leadership within the institutionalize K-12 public education enterprise.

Indeed, researchers examining one early form of educational improvement network (comprehensive school reform programs) analogized the work of managing this complexity to solving a system of interdependent puzzles, the primary pieces of which are constantly evolving and changing (Cohen et al., 2014). Moreover, researchers comparing the innovation process across sector reported that the capabilities to manage such complexity were often tacit, and that they operated below the conscious attention of expert leaders (Van de Ven et al., 1999).

For those who see value in the aspirations and potential of educational improvement networks, the preceding analysis suggests a pressing need for empirical research that has

potential to advance understandings of (and support for) the practice of hub leadership. Three questions stand out:

- What are the core domains of work that make up the practice of hub leaders, as they move the hub organization and members from "in principle" collaborators to fully developed learning systems?
- What conditions routinely complicate the practice of hub leaders?
- How do hub leaders manage those complications?

Answers to these questions will be useful in advancing the assessment and evaluation of network leadership, research on network leadership, and professional learning opportunities for network leaders.

Our Study of Network Leadership

The preceding frames and motivates our study of the work and complications of hub leadership. The study is located in a stream of work on educational improvement networks and their leadership, key dimensions of which have included development of a Network Initiation Framework (Russell et al., 2017), a Network Development Framework (Russell et al., 2019), and an associated Network Health Survey. This stream of work has been advanced in association with a) the development of a practice-based analytic approach to support leaders in developing networks as professional-scientific learning communities (Sherer et al., 2019) and b) guidance for K-12 educational leaders in transforming educational systems toward continuous improvement (Dixon & Palmer, 2020).

Within this stream of work, this study was initiated in responses to our experiences hosting a convening and follow-up meeting with experienced hub leaders in 2017. One purpose of those two gatherings was to engage experienced hub leaders in validating and extending conceptual domains in the then-still-evolving Network Development Framework, including provisional conceptual domains framing the work of hub leadership. Experience at (and feedback

from) these gatherings affirmed these provisional conceptual domains. At the same time, feedback also suggested that the provisional domains under-represented the full scope and complexity of the work of hub leaders.

That feedback informed the refinement and elaboration of the Network Development Framework and associated Network Health Survey. It also motivated this study, with the aim of probing more deeply the work and complicating conditions of hub leadership.

Approach and Sample

Our approach to answering our questions about hub leadership was to conduct semi-structured interviews with experienced hub leaders.

We began by identifying a diverse pool of educational improvement networks with evidence of having established, managed, and sustained themselves as learning systems. To do so, we selected 13 networks that either had been considered for or awarded the Carnegie Foundation for the Advancement of Teaching's "Spotlight on Quality in Continuous Improvement" award, which was established to recognize educational networks, organizations, and teams that "provide clear and powerful examples of the rigorous application of improvement principles, methods, and tools to solve educational problems". Networks were sampled purposively for variation along such dimensions as the educational problems on which the networks are working; the age/maturity of the network; the size and geographic distribution of the hub organization and members; ambitions for developing and supporting a program or "change package" for use in newly-recruited members; and the size and complexity of the hub organization.

We then purposively sampled two experienced leaders per network (n=26) for variation across a range of common leadership responsibilities: e.g., executive responsibilities, funding

raising, intellectual leadership/visioning, external liaison/political leadership, data analysis, design, and improvement coaching. In doing so, we also sampled leaders whose professional responsibilities were located entirely within the hub organization and those whose responsibilities were distributed between the hub and the permanent organization in which the hub resided.

Data Collection

In October 2018 – November, 2018, we developed an interview protocol to support a 60 minute conversation with hub leaders. See Appendix B. The protocol was designed to probe the routine and non-routine work of hub leaders. To establish the context of their work, the protocol also probed the history of their educational improvement networks, their career trajectories, and their leadership preparation and learning. Finally, the protocol was designed to test new language for four domains of leadership practice that had been introduced into the Network Development Framework and Network Health Survey: managing the hub organization; managing the network; managing environmental relationships; and leader's professional background and learning.

In December 2018 – January 2019, we (Peurach, Russell, Sherer, and McMahon) conducted interviews with the network leaders in our sample. In the course of our interviews, three observations stood out, each of which affirmed decisions and assumptions that we carried from prior experience and analysis into the interviews.

The first was that the categories and language of "managing the hub", "managing the network", and "managing environmental relationships" appeared to resonate with the hub leaders. This affirmed decisions made in further developing conceptual domains of leadership practice in the Network Development Framework and the Network Health Survey.

The second was that hub leaders took more time than allocated to describe the contexts of their work: their networks, histories, current agendas, and anticipated trajectories; and their personal histories, development, and ambitions. We interpreted this as evidence of the contextual nature of the practice of hub leadership, and of the need to understand that context in order to understand the practice, itself. A consequence, though, was that describing their contexts in detail took time away from describing their professional background and learning (which was the last section of the protocol).

The third was that our initial distinction between routine and non-routine work began to break down. Specifically, many of our interviewees reported that much of their routine work involved attending to problems arising in the hub, members, and their environments that drew attention away from work on which they would otherwise have preferred to focus. Put differently: For many of the hub leaders in our sample, their routine work was non-routine problem solving. We interpreted this as evidence of complexity in the practice of hub leadership as arising in-and-among hub organizations, members, and their environments.

Analysis

Our analysis proceeded in six primary steps.

1) In March 2019, we assigned responsibility for coding the interviews to three authors: Peurach (12 interviews), Sherer (6 interviews), and McMahon (8 interviews). We also constructed an initial coding scheme corresponding to the primary sections of the interview (and, with that, to domains of leadership practice in the Network Development Framework and the Network Health Survey):

- Network Overview
- Respondent's Professional Background and Learning
- Managing the Hub Organization
- Managing the Network

- Managing Environmental Relationships

We did not adopt additional sub-codes from constructs measured in either the Network Development Framework and the Network Health Survey. Rather, we worked inductively to develop additional sub-codes, with the aim of generating a new, empirically-derived set of sub-codes that we would then reconcile to validate our analysis, the framework, and the survey.

As a first step in elaborating our coding scheme and building inter-rater reliability, we continued with the lead author analyzing two transcripts selected purposively for differences in the size/distribution/maturity of network and the role/responsibilities of the hub leader. This involved a process of a) open coding within the five primary categories detailed above and b) writing a memo detailing decisions, observations, and reflections made while coding the interviews. Concurrently, two co-authors (Sherer and McMahon) annotated these same two transcripts to identify what they saw as potential sub-codes. We then met as a team to discuss and reconcile interpretations of the data, sub-codes (and the language used for them), and initial decisions, observations, and reflections.

In this first step, our five primary categories continued to function well to parse the interviews. One matter that did arise immediately was that of handling difficulties described by the hub leaders. Our decision was to develop a sub-code in each category called “Dilemmas, Complications, and Challenges” and to parse out the difficulties in finer detail at a later time.

2) In April, 2019, we continued to elaborate our coding scheme and to build inter-rater reliability by repeating the above exercise, though with all three analysts each coding an interview, producing a memo per interview with a revised and annotated framework, and detailing in the memo decisions, observations, and reflections made while coding. We again met

to discuss and reconcile interpretations of the data and to discuss and refine the language and meaning of the coding scheme.

With this second step, our primary categories evolved. We began to recognize that what the hub leaders had discussed when prompted about the work of "managing the network" was better captured in two categories: "managing the network as an organization" as analytically distinct from "managing improvement activity within the network". With that, our primary coding scheme expanded to six categories:

- Network Overview
- Respondent's Professional Background and Learning
- Managing the Hub Organization
- Managing the Network as an Organization
- Managing Improvement Activity in the Network
- Managing Environmental Relationships

3) In May, 2019 – June, 2019, we coded the remaining interview using this same process. Over this period, we met seven times (roughly weekly) to reconcile our interpretations and sub-codes. The product of this full exercise was 26 memos with coded data, records of decisions and interpretations, and reflections on key observations and emerging themes.

4) In August, 2019 – October 2019, the project team met four times to prepare an initial draft report on our work for collegial review at two Social Learning Seminars at the Carnegie Foundation for the Advancement of Teaching and to debrief those experiences. The report included context on this study, the design of the study, the six-category framework that was emerging from our analysis of the data, and a summary of key observations and emerging themes.

Our experiences in the Social Learning Seminars helped us in thinking how best to use a vocabulary that emerged from our analysis to describe common roles of hub leaders. Further, our

experiences heightened our sensitivity about the complexity of the frameworks that were emerging from our analysis, with appreciation for the richness of the frameworks tempered by concerns about their practical use. Given that this study was motivated by concerns among hub leaders about overly-simplified characterizations of their work, we accepted that our efforts to capture that complexity would leave us open to running criticism of this sort. Finally, our experiences had us recognizing concern with our analytic distinction between "managing the network as an organization" and "managing improvement activity within the network". We decided to maintain the distinction, because hub leaders talked about them differently (with the former a prerequisite to the latter). At the same time, we began incorporating the concept of a "temporary organization" to build a foundation in organizational scholarship on which to base this distinction.

5) In November 2019 – February 2020, we analyzed data under the "Dilemmas, Complications, and Challenges" sub-code within each of the primary categories. The analytic process began with compiling all of the sub-coded data into a new data set. We then worked inductively to create sub-codes for the that hub leaders described as complicating their work. Within sub-codes, we identified patterns in the particular ways that these circumstances complicated their work. This process yielded what we describe below as six complicating conditions:

- Legacy understandings of (and approaches to) educational improvement.
- The novelty of network-based educational improvement.
- Networks, hubs, and members as temporary organizations.
- The professional development and learning of network leaders.
- The ambitiousness and scope of improvement activity.
- Network demographics.

This process also yielded something of a "second-order" category of work labeled "Putting Out Fires". This category of work focused on ad hoc problem solving enacted by hub leaders in managing these complicating conditions.

6) In March 2020 – May 2020, we began work on (and completed a draft of) this white paper. In doing so, we further reduced and refined the "categories of work" framework and the "categories of complicating conditions" frameworks. We drew from organizational, policy, innovation, and improvement research to build the motivating/interpretive frame detailed above. And we animated the "work" and "complications" frameworks with language, context, and interpretation using our motivating/interpretive frame.

In April 2020, we had planned to validate the "work" and "complications" frameworks at a session for experienced hub leaders at the 2020 Carnegie Summit on Improvement in Education. However, the place-based Summit was moved to an online format as a consequence of the COVID-19 pandemic, and the work that we had planned for this session was not amenable to an online format.

Quality Checks

The findings and interpretations from our study coordinate with the Network Development Framework and Network Health Survey (including testing/validating concepts and language from those resources). Our analysis process yielded detailed memos for each interview, and these memos were discussed and reconciled in detail by the three of the co-authors in regular meetings over four months. Our analysis benefitted from collegial review at two Carnegie Social Learning Seminars. And our findings and interpretations are grounded deeply in theory and research on organizations, policy, innovation, and improvement.

While strong in all of these ways, our findings and interpretations are limited in others. For example, we intentionally sampled experienced leaders from established networks with reputations for (and evidence of) quality improvement practices. We did not sample fledgling or struggling networks, nor did we sample novice leaders. We did not interview member leaders, such that we only have partial perspective on network leadership as fully distributed throughout educational improvement networks. We have not yet engaged experienced hub leaders in a discussion of our findings and interpretations, so we do not yet know if our work is responsive to concerns that our frameworks do not capture the full scope and complexity of hub leaders. We have not yet reconciled our findings and interpretations with the Network Development Framework or the Network Health Survey. And we have not yet reconciled our findings and interpretations with the other associated leadership research and development efforts ongoing at the Carnegie Foundation for the Advancement of Teaching.

As a consequence, the following findings and interpretations should be understood as provisional. Moreover, as complex as they are, the above-described limitations support the conjecture that further study across the full complement of hub and member leaders in more diverse networks would yield even more complex perspectives on hub and network leadership.

Findings and Interpretations

We continue by reporting what we learned from the 26 experienced hub leaders in 13 networks about the work of establishing, managing, and sustaining educational improvement networks; about the conditions that complicate their work; and about ways that they manage these complications. As framed at the outset, this is worked that we understand to be enacted:

- By hub leaders lacking the comprehensive, institutionalized professional legitimacy and supports of conventional educational administrators and leaders.
- In networks that operate as (and that are comprised of) temporary organizations, with aspirations for functioning as scientific-professional learning communities.

- With-and-among districts, schools, and classrooms deeply habituated to a ubiquitous approach to organizing and managing instruction in ways that structure low quality, inequitable educational opportunities, experiences, and outcomes for many students, with some advancing alternative approaches to organizing and managing instruction with the aim of improving quality and reducing disparities.
- In environments featuring a) a sustained societal press for excellence and equity advanced through multiple, uncoordinated policy logics and a fragmented, incoherent governance structure, b) highly developed innovation infrastructure that reinforces status quo approaches to organizing and managing instruction, and outcomes, and c) weak innovation infrastructure supporting the practice-based innovation and improvement.

The Work of Hub Leaders

In our analysis, the work of the hub leaders with whom we spoke fell into four core domains, each with associated responsibilities:

1) Developing and managing the hub organization.
   a) Developing and managing the hub leadership team.
   b) Developing and managing the hub as a formal organization.
   c) Developing and managing the hub as a social organization.
   d) Establishing, maintaining, and "managing against" a clear vision, strategy, and operating agenda.
2) Developing and managing the network as an organization.
   a) Building and managing network membership.
   b) Developing and managing member leadership.
   c) Developing and managing the network as a formal organization.
   d) Developing and managing the network as a social organization.
   e) Supporting member leaders in establishing, maintaining, and "managing against" member-level visions, strategies, and agendas.
3) Supporting and managing improvement activity.
   a) Assessing and developing formal organization for improvement.
   b) Assessing and developing social organization for improvement.
   c) Supporting, collaborating in, and engaging in iterative improvement activity.
   d) Establishing, maintaining, and "managing against" a coherent vision, strategy, and operating agenda.
4) Managing environmental relationships.
   a) Securing and managing funding.
   b) Aligning with expectations, values, and priorities in environments.
   c) Structuring and managing administrative relationships.

d) Building and maintaining social/political understanding and support.
e) Maintaining and leveraging "technical relationships" bearing on improvement activity.

In Appendix C, we elaborate these domains of work and the categories of responsibilities within them. We also includes examples of the types of tasks associated with those responsibilities. With that, Appendix C is a blend of analysis (i.e., identification of the core domains of work and associated responsibilities drawn from conversations with hub leaders), interpretation (i.e., explications of the work and responsibilities, animated by the earlier analysis that motivated and framed this study), and supporting evidence (i.e., examples of associated tasks as reported by network leaders). Structured using this domains/responsibilities/tasks structure, readers are free to approach Appendix C at a level that satisfies their interests and that serves their needs.

Reflecting on the work of hub leaders as represented in Appendix C, four points stand out.

Familiarity. As summarized in Appendix C, the core work of hub leaders is, in many ways, remarkably familiar. The core work as described by those with whom we spoke was readily parsed and categorized using established concepts and language in organizational, policy, innovation, and improvement research. Indeed, from early, seminal syntheses of organizational research (Thompson, 1967) to contemporary, rolling syntheses of organizational research (Scott & Davis, 2015), all of the elements are there: establishing and aligning identity, strategy, and operating agendas; developing and coordinating formal organization, social organization, and technical capabilities; managing relationships with environments; and developing, distributing, and coordinating leadership.

Volume and Diversity. Just as it is remarkable for its familiarity, the core work of hub leaders as summarized in Appendix C is remarkable for its volume and diversity. Hub leaders appear to shoulder a tremendous and varied workload: as sketched above, virtually everything organizational under the sun. As described by hub leaders in accounts of their day-to-day work, all of these domains of work, their associated responsibilities, and their component tasks are in play on any given day, week, or month. That, in turn, suggests that the day-to-day work of hub leadership requires a broad, diverse theoretical and practical knowledge base, if these many, diverse functional responsibilities are to be enacted with high degrees of competence and coordination.

Complexity. As summarized in Appendix C, the core work of hub leaders appears to be complex. Again, it is remarkable not only for the volume and diversity of functional responsibilities but, also, for the interdependence among these functional responsibilities, each often conditioned on others. These multiple, interdependent functional responsibilities repeat themselves in multiple organizations: in the hub as an organization; in multiple members as organizations; and in the network as an organization. On the one hand, these multiple organizations maintain high degrees of independence and autonomy; on the other hand, they are also interdependent, and their work depends on high degrees of collaboration. These multiple organizations operate in interaction with multiple environments that may or may not overlap, and that may or may not have similar meaning for different organizations.

Ratio. As summarized in Appendix C, perhaps most striking in the work of hub leaders is the ratio of organizational development to collaborative improvement. It would appear that the vast majority of the work of hub leaders focuses on developing, managing, and sustaining the hub, members, and the network as organizations. That is even the case for the work of engaging

and supporting improvement activity, which itself requires developing formal and social organization beyond that which holds hubs and members in relation. By contrast, enacting and supporting the core, technical work of improvement across the network, in coordination with technical relationships in environments, is but a small portion of the work of hub leaders as if the technical pinnacle atop a pyramid of organizational prerequisites.

Conditions that Complicate Hub Leadership

As summarized in Appendix C and discussed above, the work of hub leadership appears to be complicated by endemic complexity: many interdependent functional responsibilities distributed across multiple organizations that play out simultaneously, both independently and interdependently, in interaction with multiple environments.

Yet, in describing their work, the hub leaders with whom we spoke went beyond describing this sort of endemic complexity. They also described additional circumstances that made the work even more complicated. In our analysis, the conditions that complicated their work fell into six categories:

1. Legacy understandings of (and approaches to) educational improvement.
2. The novelty of network-based educational improvement.
3. Networks, hubs, and members as temporary organizations.
4. The professional development and learning of network leaders.
5. The ambitiousness and scope of improvement activity.
6. Network demographics.

In Appendix D, we elaborate these complicating conditions, again drawing on the earlier analysis that motivated and framed this study. We also provide examples of ways that hub leaders described these complicating conditions as bearing on their core work. With that,

Appendix D is, again, a blend of analysis, interpretation, and supporting evidence that readers can approach at a level that satisfies their interests and that serves their needs.

Reflecting on the work of hub leaders as represented in Appendix D, three points stand out.

Context. As summarized in Appendix D, the work of hub leadership appears to be complicated tremendously by the contexts in which educational improvement networks are emerging and operating. Indeed, descriptions of complicating conditions among these hub leaders echoed and animated the key dimensions along which we motivated and framed this study: a broader reform context in which legacy dysfunction in environments, districts, schools, and classrooms coexists with varied logics, approaches, and designs for advancing quality and equity; educational improvement networks as temporary organizations being pressed to address intractable problems of educational equality and inequity in large numbers of districts, schools, and classrooms, in environments that are sometimes friendly and often hostile; and hub leaders lacking institutionalized supports for their practice and learning.

Constraint. From one perspective, the complicating conditions as summarized in Appendix D function as fixed constraints on the work of hub leaders, with endemic complexity in the contexts of educational improvement networks compounding endemic complexity in the core work of hub leaders. The roots of these complicating conditions stretch far beyond the influence of any given educational improvement network, and likely beyond the influence of any collection or association of educational improvement networks. Educational improvement networks cannot ameliorate the sustained, increasing societal press for educational excellence and equity. They cannot obviate legacy dysfunction. They cannot slow the evolution of districts

as instructionally-focused education systems. They can effect supporting innovation infrastructure, nor institutionalized supports for the practice and learning of hub leaders.

Control. From another perspective, the complicating conditions as summarized in Appendix D function as variable parameters over which hub leaders can exert some level of control. Yet exerting that control risks obviating the need for the educational improvement network. For example, hub leaders can elect to work in states, districts, schools, and classrooms that are less fraught with legacy dysfunction, and that are farther along in evolving as instructionally-focused education systems. They can elect to work on less complex improvement problems, and at a small scale. But the incentives of stronger districts, schools, and classrooms in stronger state contexts to enlist in (and to bear the costs of participating in) educational improvement networks are not clear, nor are the ways that a network operating in such contexts garners identity, legitimacy, and resources among constituents, communities, and patrons in broader environments. Put differently: To eliminate complicating conditions is to eliminate the *raison d'etre* of educational improvement networks.

Managing Complicating Conditions

If the preceding analysis is on the mark, then the *raison d'etre* of educational improvement networks is to manage complicating conditions in the complex educational contexts from and in which they emerge and operate. From one perspective, this compounding complexity begins to appear intractable. Indeed, several of the hub leaders with whom we spoke described their work as turbulent and unpredictable, as requiring far more time than is formally allocated, and as emotionally and physically exhausting. Yet, from another perspective, we spent hours talking to 26 experienced hub leaders who, as evidenced by the operations, outcomes, and

viability of their networks, appeared to be managing these layers of complicating conditions with some level of success.

And that begs the question: How do hub leaders manage these complicating, compounding conditions? Our approach to data collection (i.e., exploratory, semi-structured interviews) provided some preliminary evidence from which to construct a response.

Differentiation. As reported in Appendix C (and discussed in the preceding sub-section), one wrinkle to managing these complicating, compounding conditions was to develop hub leadership teams with differentiated, distributed responsibilities; structuring opportunities for professional development and learning (formal, informal, and individual); and developing and distributing leadership in members in these same ways. The array of hub leadership roles included:

- Administrative leader, with primary responsibility for general management and logistics within the hub.
- Intellectual leader, with primary responsibility for setting, maintaining, and adapting the educational vision and agenda of the hub.
- Design leader, with primary responsibility for building, testing, and refining resources and tools for use in the hub and the network.
- Data leader, with primary responsibility for gathering, analyzing, and communicating evidence of network performance.
- Knowledge leader, with primary responsibility for gathering, maintaining, and sharing practical knowledge as it accumulates in the network.
- Improvement leader, with primary responsibility for supporting improvement activity in and among members in the network.
- Institutional leader, with primary responsibility for managing the boundaries of the hub, the network, and their environments.

Evaluation. Also as reported in Appendix C (and discussed in the preceding sub-section), another wrinkle to managing these complicating, compounding conditions was to build and leverage information systems in the hub, in members, and across the network with which to monitor participation, improvement activity, progress, and knowledge products.

Coalignment. As reported yet again in Appendix C, yet another wrinkle to managing these complicating, compounding conditions was constant engagement in the type of superordinate co-alignment famously described by Thompson (1967). That is, hub leaders described working constantly and actively to craft, recraft, and coordinate the visions, strategies, and operating agendas of the hub, members, and the network to maintain external legitimacy/support and internal coherence/direction.

Dilemmas. And, with that, a pattern begins to emerge: Nearly every dimension of Appendix C can be interpreted as yet another wrinkle in managing these complicating, compounding conditions. Put differently: Managing complicating, compounding conditions requires complicating the work of hub leadership (as framed in Appendix C). But that, in turn, introduces vulnerabilities to the contexts in which that work is situated (as framed in Appendix D). Such is the dilemma-fraught character of hub leadership.

Extinguishing. The dilemma-fraught character of hub leadership likely explains one final, core domain of work for hub leaders, and one last wrinkle to managing compounding, complication conditions. To a person, every hub leader with whom we spoke explained that much of their day-to-day work focused on putting out fires. Several of the hub leaders with whom we spoke chalked this up as “change management”, and several others chalked it up as “solving adaptive problems”. That, in our view, undersells the complexity of the work of putting out fires as discussed across the full complement of hub leaders. Looking across the full complement yields a collection of “meta-responsibilities” that sat atop of all else that they did; that played out over long periods of times across organizations and in moment-to-moment micro-interactions with individuals; and that would appear to require specialized knowledge, capabilities, and dispositions all their own. Examples of these responsibilities included:

- Conflict resolution, negotiation, and salesmanship.
- Navigating asymmetric power dynamics.
- Managing others' expectations (including expectations about the time required to establish networks and to realize a positive yield on improvement activity).
- Managing others' stress and providing emotional support.
- Maintaining collective discipline amidst uncertainty and ambiguity.
- Maintaining others' commitment and engagement.
- And more.

Discussion

Thus, the preceding study integrates evidence, analysis, and interpretation: conversations with 26 hub leaders to learn about their work, its complications, and how they manage those complications, through the lens of a synthesis of research on the contemporary educational reform landscape, educational improvement networks, and network leadership. It is novel and original in these ways, and strong in its scope and method.

Yet findings and interpretations from the preceding study are also provisional. They have not yet been subject to the scrutiny of experienced hub leaders. And they do not yet incorporate the diverse perspectives of a full complement of novice and experienced hub and member leaders across a range of weak and strong networks.

Our conjecture is that incorporating these additional perspectives would do more to further complicate than to simplify the findings and interpretations reported here. Indeed, among the intuitions that we take from this study is that network leadership is both far more complex than most proponents and supporters of educational improvement networks imagine and far more complex than we report here. And that has us circling all the way back to the feedback from experienced leaders that motivated this study.

With that, our view is that the preceding study, though provisional, is sufficiently ambitious and robust to support consideration of possible implications for the assessment and

evaluation of network leadership, for further research on network leadership, and for the professional development and learning of network leaders.

Assessment and Evaluation of Network Leadership

A first order need is to collaborate with researchers to reconcile findings and interpretations from this study with leading efforts to assess and evaluate network leadership. Two such efforts stand out.

The first is the Network Development Framework and associated Network Health Survey discussed above (Russell et al. 2019). This study suggests value in discussing the possible re-alignment of the primary categories to distinguish between the work of "developing and managing the network as an organization" and "engaging and supporting improvement activity". It suggests value in discussing the constructs measured within the four core domains of work, and in reconciling the associated responsibilities and tasks reported here with the constructs and items currently being used. It suggests potential to incorporate conventional language from organizational research to frame these constructs, with the aim of making the framework and survey more generally useful across diverse networks (and less tied by language to the networked improvement communities from which the framework and survey emerged). Finally, it suggests the possibility of leveraging the "complicating conditions" reported here to construct a set of mediating variables that sit between the work of network leaders and the development of networks as scientific-professional learning communities: e.g., measures of legacy dysfunction; of the novelty of formal improvement methods; of the status of "temporary" hub and member organizations within their "permanent" organizations; of the complexity of improvement of improvement activity (e.g., as measured by the distance between improvement aims and extant, modal practice); and of network demographics.

The second is the Evaluation for Improvement framework discussed above (Sherer et al., 2019). This study has potential to guide reflection on the three-level nested model around which the framework is organized. It has potential to guide reflection on assumptions about the scope and complexity of the work of network leadership teams. It has potential to guide reflection on the knowledge, skills, and dispositions required of analytic partners in support the practice and learning of network leaders. Finally, it has potential to guide the construction of field protocols (and associated language) to be used jointly by analytic partners and network leaders to generate evidence about a) the work of network leaders as distributed across the three levels that organize the framework and b) the historical and contemporary contexts in which their work is situated.

Research on Network Leadership

This study suggests advantage in pursuing five lines of further research on network leadership.

The first is research of that sort reported here, but that addresses its limitations. This would be further interview-based research with both a more representative sample of hub leaders and, potentially, with member leaders. It would also benefit from explicit attention to conditions that not only complicate the work of network leaders but, also, enable it. Such research would provide opportunity both to validate, refine, and extend the frameworks developed in this study. The perspectives of member leaders would be especially important for refining and extending the work of "developing the network as an organization". Such research would also create potential to probe positive synergies among networks and their permanent organizations, including districts that appear to be developing as instructionally-focused education systems. Indeed, among the puzzles that we noted in our analysis is the absence of evidence about positive

network-district relationships: perhaps as an artifact of our interview strategy, or perhaps because none of the networks we sampled were working in positive district contexts.

The second is survey research exploring the occupational demographics of network leaders. Such research would explore the differentiation of leadership roles within hubs; the distribution of responsibilities among leadership roles; the preparation, knowledge, and dispositions of role incumbents; network demographics; and contexts in which hubs are situated. Evidence from such survey research would support description of the "landscape of hub leadership". It would support analysis of differentiated hub leadership teams, cognition/problem solving as distributed among hub leadership teams, and how these matters vary with network demographics and broader contexts. It would also support a sort of "gap analysis" examining a) the responsibilities of leaders in differentiated roles and b) the preparation, knowledge, and dispositions that they bring to their work. That, in turn, has potential to support the design and differentiation of professional development and learning opportunities for hub leaders.

The third is focused qualitative research that scrutinizes in detail the work of "putting out fires" as discussed above under the label of "extinguishing". This is ad hoc, non-routine, ubiquitous work that appears to occupy a great deal of the time of hub leaders. It appears to play out in micro-interactions among hub leaders and individuals, in group dynamics among hub leadership teams, and in inter-organizational dynamics among hubs, members, and environmental constituents. While interviewing of the sort conducted in this study was useful for surfacing this work and its central role in the practice of hub leaders, understanding its nuances would benefit from careful quantitative analysis of the "critical incidents" variety, either observed in real time or constructed artificially.

The fourth is reviews of research. These would include a more developed review of research on network leadership than provided above. It would also include reviews of research in three other fields, couched in the ambitions and contexts of educational improvement networks: temporary organizations, the management of innovation, and pre-professional and practice-based leadership development (including coaching and leadership learning networks). This study borrows from these literatures for its initial motivation and framing, and it points to these literatures as potential resources for deepening our understandings. Reviews of these literatures (again, couched in the ambitions and contexts of educational improvement networks) would be rich resources supporting further research on network leadership (as discussed immediately above) and for advancing the professional development of network leaders (as discussed immediately below).

The fifth is the production of translational research. Indeed, one thing over which we puzzled in our conversations with hub leaders is that none with whom we spoke described managing complicating, confounding conditions by engaging in any sort of deep study of the complex educational contexts in which the roots of these conditions lie. Put differently: There was nothing in our conversations with hub leaders that would lead us to suspect that they read any literature of the sort that we used to motivate and to frame our study of their work. Yet it was our reading of this literature that positioned us to understand, appreciate, and explicate the complexity of their work. That, in turn, suggests a need for translational research to support leaders in better understanding, appreciating, and enacting their own work. This, too, would serve the professional development of network leaders (as discussed immediately below).

Professional Development of Network Leaders

There is much in this study to reinforce the imperative to strengthen initiatives and programs supporting the professional development of network leaders. As suggested immediately above, this should begin with a review of research on pre-professional and practice-based leadership development. This study further suggests advantage in advancing the professional development of network leaders across five cascading dimensions, in coordination with the agendas for assessment and research sketched above.

First, this study suggests possible opportunity in discerning more carefully ways in which conventional, general leadership development in and beyond education could support the professional development of network leaders. Again, as framed in Appendix C, the core work of hub leaders is in many ways remarkably familiar and readily framed using concepts and language from organizational, policy, and improvement research. That, in turn, suggests the possibility of leveraging general leadership development initiatives and programs in ways that coordinate explicitly with frameworks detailing the work and complications of hub leadership.

Second, research on occupational demographics as sketched above has potential to support more targeted professional development for network leaders organized around common leadership roles, functional responsibilities, and knowledge gaps. Moreover, such research has potential to support professional development for network leaders further differentiated by network demographics and proximal contexts. Finally, it has potential to support professional development for leadership teams, focusing on ways in which knowledge and cognition are distributed and coordinated in their day-to-day work.

Third, this study suggests potential advantage in the use of the Network Health Framework, the Network Health Survey, and the Evaluation for Improvement frameworks as resources for network leaders' practice-based professional development and learning, especially

if further coordinated with frameworks from this study and with each other. Collectively, these frameworks present as raw ingredients of a practice-based coaching model for network leaders focused not only on immediate problems of practice but, also, on grounding both general and differentiate professional development of the sorts described immediately above more deeply in the day-to-day work of network leaders. That said, devising a practice-based coaching model of this sort would benefit from a literature review on leadership development of the sort sketched above, with specific attention to challenges of developmental evaluation and associated coaching practices identified in earlier research (e.g., Peurach, Lenhoff, & Glazer, 2016).

Fourth, research on the work of "putting out fires" has potential to inform the professional development and learning of experienced network leaders as they advance to higher levels of responsibility for expert, ad hoc problem solving. One potential form of this type of expert professional development is leadership learning networks: i.e., professional communities of network leaders that co-engage in addressing ad hoc problems that present as unique and non-routine in the experiences of individual leaders, hubs, and networks but that otherwise arise routinely among leaders, hubs, and networks. But, again, advancing such leadership learning networks would benefit from a literature review on leadership development of the sort sketched above, with specific attention to addressing challenges of leadership learning networks as discussed by the hub leaders in this study and as identified in earlier research (e.g., Glazer & Peurach, 2019; Peurach, 2016; Peurach & Glazer, 2018).

Fifth, this study suggests potential advantage in professional development opportunities for network leaders that engage them deeply in the type of translational research imagined above. To produce translational research that synthesis leading organizational, policy, innovation, and improvement research is one thing. To read, understand, and make meaning and use of it is

another. Professional development of this sort has potential to support the type of "intellectual leadership" about which several hub leaders spoke, reflective and introspective practice among leaders and leadership communities, and fuller consideration and more deft management of the conditions that complicate practice.

Conclusion

The purpose of this analysis was to open the black box of hub leadership in educational improvement networks as a novel approach to advancing educational excellence and equity. Our approach was to develop an interpretive framework that situated educational improvement networks and hub leaders in a broader educational landscape in which transformational reform plays out in interaction with legacy dysfunction. We used that interpretive framework to analyze conversations with experienced hub leaders in established networks about their day-to-day work.

What we see in that black box is work that is sprawling, complex, and focused as much (if not more) on organizational development as on collaborative improvement. We see complicating conditions over which hub leaders have little control, with deep roots in the historical and contemporary contexts of US public education. We see that managing those complications requires a sort of "meta-work" that sits atop all else, the details of which have yet to be discerned. And we argue that enacting the work of hub leadership at a high level and to meaningful effect is contingent on coordinated efforts to advance the assessment and evaluation of hub leadership, research on hub leadership, and professional development for hub leaders.

Yet, peering more deeply into the black box of hub leadership, beyond the day-to-day work and the conditions that complicate it, we also begin to see much more. For the same societal and policy presses that appear to be driving the development of educational improvement networks as scientific-professional learning communities appear to be driving the

development of public school districts as instructionally-focused education systems. The former are temporary enterprises that build and use novel organizational infrastructure to support the production, use, management, and refinement of practical knowledge. The latter are permanent organization that build and use novel educational infrastructure to support the organization and management of instruction. Both operate in interaction with legacy dysfunction. Both operate in fragmented, incoherent, and turbulent environments that make clear their imperative — advancing educational excellence and equity— but that have yet to fully develop macro-level innovation infrastructure to support their work.

These two organizational forms emerged concurrently, in the 1990s, as the societal press for educational and excellence began to find fuller expression in policy logics and policy regimes. Since then, they have evolved in odd relation. Some districts have outsourced responsibility for improvement to educational improvement networks. That's what often has networks operating as temporary organizations in district contexts rife with legacy dysfunction and in which collaborative improvement in a ground-up enterprise. Some districts are taking on the work of improvement. Yet, of new patterns of instructional organization and management emerging in districts, most lack an architecture that supports functioning as fully-formed learning systems.

From one perspective, this leads us to a grim place. Two novel, leading organizational forms for pursuing educational excellence and equity appears to have fatal flaws.

From another perspective, this leads us to a hopeful place, as strengths of each organizational forms play to weaknesses of the other. And that, in turn, begins to open up new questions about the possibility of integrating the two: the possibility of coordinating work in

districts and networks to develop as instructionally-focused education systems and as scientific-professional learning communities

Advancing a fully-formed vision of the integration of instructionally-focused education systems and scientific-professional learning communities is work for another day, and will require bringing all that we have learned and written here about hub leadership into tighter coordination with parallel developments and needs in conventional educational leadership. But it's the broadly outlines of that vision that we see when we peer more deeply into the black box of hub leadership.

Appendix A
Typology of Instructionally Focused Education Systems

System Type	Distinguishing Characteristics
Managerial	• Theory of action: Faithful use of a standard, high quality educational approach district-wide will ensure consistency and coordination in instruction in and among schools and, with that, improve educational opportunities and outcomes on average while reducing disparities. • Distribution of work: Characterized by a standard educational approach developed by the central office and administered with fidelity in schools.
Market-Driven	• Theory of action: Reducing central office control, increasing school autonomy, and introducing market competition will improve quality and reduce disparities by stimulating school-level entrepreneurship and innovation responsive to families, communities, and policy. • Distribution of work: Characterized both by (a) the central office establishing or approving a portfolio of schools, setting enrollment targets, and setting performance targets and (b) responsibility in schools for devising differentiated educational approaches, with families and communities choosing among schools that are aligned with their educational values and aspirations.
Federated	• Theory of action: Knowledge, capabilities, and values in schools and their communities are essential resources for organizing and managing instruction in ways that improve quality and reduce disparities, with the central office providing supports to mobilize school-specific knowledge, capabilities, and values while structuring parameters that ensure a level of district-wide coherence. • Distribution of work: Characterized by efforts to balance standardization and differentiation, with (a) the central office establishing common components of educational infrastructure, district-wide and (b) schools adapting, extending, and using centrally-established components to respond to the educational aspirations, values, and needs of their particular students, families, and communities.
Networked	• Theory of action: Coordinating district-wide educational conventions with school-level adaptation creates potential both (a) to elevate the quality of routine educational work consistently across schools and (b) to reduce disparities in educational outcomes by addressing particular educational needs and problems experienced by schools, classrooms, and students. • Distribution of work: Characterized by efforts to balance standardization and differentiation, with (a) the central office establishing a comprehensive, district-wide educational approach; (b) schools enacting the educational approach in ways that balance district-wide educational conventions with local adaptation and problems solving; and (c) positive adaptations and solutions fed back to the central office, incorporated in the district-wide educational approach, and used by other schools throughout the district.

Appendix B
Network Leadership: Protocol — Initial Exploratory Interview

December 03, 2018

Purpose (2 minutes)

We are beginning to discipline efforts within the Carnegie Foundation for the Advancement of Teaching to understand the practice of network leadership.

To do so, we are conducting interviews with roughly 25 network leaders to learn about their day-to-day work. We will use this evidence to work inductively, from the insights of practicing leaders to general framework that captures essential categories and domains of leadership practice.

This "practical framework of network leadership" will be a resource for focusing our leadership development efforts and for organizing leadership learning networks.

Establishing Context (10 minutes, max)

To get started, I'd like to spend just a few minutes learning a bit more about (XYZ network) and the (XYZ hub organization).

1. How old is the network...? How many participants...?

2. Can you tell me about the hub organization...? For example, the number of people, the primary roles and teams, and the hub leadership team...?

3. When did you join (hub organization)...? What did you do prior to joining...?

4. What's your estimate of how much of your time you spend leading and managing (XYZ hub organization)…? Is that the right amount of time, in your view…? What are your primary responsibilities beyond leading and managing (XYZ hub organization)…?

A Day in the Life (20 minutes)

To continue, I'm interested in digging more deeply into your work as a network leader/manager.

1. Tell me about an ideal day managing (XYZ hub organization). It's a sunny and breezy morning. All of your other responsibilities are under control, and, today, you're going to focus on your responsibilities as a hub leader. You walk into your office, turn on the lights, and do... what...? Why...? What are you aiming to accomplish...? What happens

when you do these things well...? What happens when you don't...? [Note: Focus them on the network, vs. other leadership work they might do.]

2. If that's an ideal day as a hub leader, tell me about a tough day. It's drizzling and windy. You walk into your office, turn on the lights, and... what happens...? What dilemmas and challenges come up…? Why do these things draw your time and attention...? What would happen if you ignored them...? [Note: Listen for problems within and/or beyond the network. Prompt for within/beyond, if they don't mention it.]

3. As a hub leader, what is the ratio of ideal days to tough days...? And what, then, is a typical day...?

4. On a typical day, who are your primary colleagues in this work as a hub leader...? Who do you reach out to, in the hub organization and the network, to get done everything that needs to get done so that (XYZ network) functions as a learning and improving enterprise...?

5. In what ways is your work leading (XYZ network) similar to your other leadership responsibilities…? In what ways is it different…?

Digging Deeper (20 minutes)

Now, let's dig a little deeper.

[Note: The following are phrased as if the respondent has crept up onto them in his/her earlier comments. If that isn't the case, open with those that he/she *has* discussed, and reframe the others: e.g., "Hub leaders often mention focused their time/attention on managing the hub/managing network operations/managing the environment. However, you didn't talk much about that. I'm curious: Does managing the hub/managing network operations/managing the environment ever draw your time and attention…?"]

1. As you talked, one category of your work seems to be maintaining and managing the hub organization, itself. Is that the case...? What are the things that routinely draw your time and attention...? Are there things that pop up occasionally and infrequently that draw your time and attention...? Who are your primary colleagues in doing this work…?

2. Another category of your work seems to be supporting improvement activity throughout the network. Is that the case...? What are the things that routinely draw your time and attention...? Are there things that pop up occasionally and infrequently that draw your time and attention...? Who do you work with...? Who are your primary colleagues in doing this work...?

3. Those first two categories of work seemed to be "inward-facing", as they focus largely on the management and operations of the hub and the network. A third category of work seems to be more "outward-facing", and focused on managing the relationship between

the (XYZ network and hub organization) and its environments: i.e., district and community constituents, funders, the research community, local/state/federal policy contexts, and more. Is that the case...? What are the things that routinely draw your time and attention...? Are there things that pop up occasionally and infrequently that draw your time and attention...? Who are your primary colleagues in doing this work...?

4. If pressed to give a ballpark estimate, what would you say is the rough distribution of your time and attention among these three domains of work: i.e., managing the hub organizing, managing network operations, and managing environmental relationships...?

5. [Note, for our back pockets: Is there work that you wish you could do, but somehow don't have time or room for…? Why don't you have room for those things…?]

Professional Learning and Values (time permitting; don't rush to get here)

This seems to be very difficult work.

1. In what aspects of your work do you feel most successful…? What has you saying that…? What aspects do you most struggle…? What has you saying that…?

2. What, in your prior professional life, prepared you for this work...? Your academic training contribute to this work...? Your prior professional experience...? Something else…?

3. In our leadership role in (XYZ hub organization), what have been your most valuable professional learning experiences...? Your team as a professional learning community...? Leadership learning networks...? Seminars and conferences...?

4. This type of work seems to take a person with a particular mindset and values. What type of person succeeds in this work...? What type of person struggles...?

Final Thoughts (2 to 3 minutes)

Thank you very much for taking time out of your very busy schedule to talk today.

1. Before we go, do you have any final thoughts that we should keep in mind as we discipline our understanding of the practice of network leadership...?

2. Our plans are to conduct follow-ups to these initial interviews, possibly one-on-one (to fill any gaps in our data collection) or in focus groups (to review and get feedback on what we are learning). Are you open to participating in these follow-ups…?

Thank you!

Appendix C
The Work of Hub Leaders

In our analysis, the work of the hub leaders with whom we spoke fell into four primary categories:

1. Developing and Managing the Hub Organization.
2. Developing and Managing the Network as an Organization.
3. Engaging in (and Supporting) Improvement Activity.
4. Managing Environmental Relationships.

1. Developing and Managing the Hub Organization

As educational improvement networks are established, hub organizations often are not existing units or teams that are repurposed to support network-based improvement, nor do they typically sit neatly within the established hierarchical or bureaucratic structures within educational organizations. Rather, hub organizations are often newly-established units or teams that either sit outside established hierarchical, bureaucratic structures within organizations or that span organizations. Some continue to operate as temporary organizations over time; others establish themselves as non-profit or other types of permanent organizations. In our analysis, the work of developing and managing the hub organization as discussed by the hub leaders who we interviewed fell into four primary categories:

A. Developing and managing the hub leadership team.
B. Developing and managing the hub as a formal organization.
C. Developing and managing the hub as a social organization.
D. Establishing, maintaining, and "managing against" a clear vision, strategy, and operating agenda.

1.A. Developing and Managing the Hub Leadership Team: Developing and managing a hub organization is contingent on developing and managing a hub leadership team. Hub leadership teams can range from a small, originating group of colleagues collaborating to launch a new network to a larger, differentiated team with specialized responsibilities for different dimensions of the work (e.g., executive leadership, design, evaluation, or coaching). Hub leadership teams can exist within a single permanent organization (e.g., a district office, a university, or a non-profit organization), and they can span permanent organizations (e.g., a team of colleagues working across universities). In our analysis, the work of developing and managing the hub leadership team as discussed by the hub leaders who we interviewed includes:

- Developing formal structures for hub leadership, dimensions of which include:

    - Establishing and distributing leadership roles and responsibilities.
    - Establishing contexts, routines (e.g., standing meetings), tools (e.g., protocols), and IT platforms to support formal and informal communication and coordination among hub leaders.
- Developing social structures for hub leadership, dimensions of which include:
    - Establishing norms and core values of the leadership team.
    - Recruiting, onboarding, and socializing leaders into the hub as an organization, into the hub leadership team, and into their leadership roles and responsibilities.
    - Maintaining positive relationships, commitment, and engagement among the hub leadership team.
    - Supporting the professional learning and development of hub leaders through formal learning opportunities (e.g., training sessions), social learning opportunities (e.g., mentoring, coaching, opportunities for collegial learning), and individual learning opportunities (e.g., self-reflection).

1.B. Developing and Managing the Hub as a Formal Organization: As with any organization, one task for hub leaders is to develop and manage the structures, teams/units, roles, technologies, and capabilities of the hub as a formal organization. Hub organizations can emerge and begin operating with little formalization but often become increasingly formally organized as the hub and the network grow, mature, and evolve in interaction. In our analysis, the work of developing and managing the hub as a formal organization as discussed by the hub leaders who we interviewed includes:

- Developing and managing a) the formal roles and responsibilities of hub staff and b) the units and teams in which hub staff are organized.
- Developing and managing contexts, routines, tools, and IT platforms to support formal and informal communication and coordination among hub leaders and hub staff.
- Developing and managing an IT platform to support data management, analysis, and reporting.
- Developing and managing conventional business functions and systems (e.g., finance, budget, human resources, performance evaluation systems, etc.).

1.C. Developing and Managing the Hub as a Social Organization: A complement to the preceding is developing and managing the individual staff members in the hub organization, and the understandings, values, and norms among them that bring meaning and structure to their work. Strengthening the social organization at the time of emergence can be especially important, when the formal organization of the hub is often weakly developed. It remains important as the hub and network grow, mature, and evolve in interaction, and as more (and more varied) people join the hub and bring with them more varied understandings, values, and

norms. In our analysis, the work of developing and managing the hub as a social organization as discussed by the hub leaders who we interviewed includes:

- Establishing core values, norms, and language in the hub organization, teams, and units.
- Recruiting, onboarding, and socializing staff into the hub as an organization, their teams/units, and their roles and responsibilities.
- Building and nurturing trust, positive relationships, commitment, and engagement among hub staff.
- Supporting the professional learning and development of hub staff through formal learning opportunities (e.g., training sessions), social learning opportunities (e.g., mentoring, coaching, opportunities for collegial learning), and individual learning opportunities (e.g., self-reflection).

1.D. Establishing, Maintaining, and "Managing Against" a Coherent Vision, Strategy, and Operating Agenda: A primary responsibility of the hub leadership team is to establish a vision for the hub organization, as well as a strategy and operating agenda for pursuing that vision. This vision, strategy, and agenda build common identity and shared purpose among hub staff, and function to coordinate their work. This vision, strategy, and agenda are also important for establishing identity and legitimacy among constituents and patrons both in the permanent organization(s) in which the hub is situated and in the broader environments in which it operates (matters taken up below, under "Managing Environmental Relationships). In our analysis, the work of establishing, maintaining, and "managing against" a coherent vision, strategy, and operating agenda as discussed by the hub leaders who we interviewed includes:

- Developing and articulating a clear vision, strategy, operating agenda, and supporting rationale.
- Building shared understanding of/commitment to the hub's vision, strategy, and operating agenda.
- Aligning strategy and operations by prioritizing and coordinating among possible agenda items.
- Planning and running disciplined meetings coordinated tightly with this vision, strategy, and operating agenda.
- Maintaining clear communication and effective coordination among hub leaders and staff.

2. Developing and Managing the Network as an Organization

Just like hub organizations, networks are typically not existing sub-structures within educational organizations, nor are they existing systems of relationships across organizations. As discussed

above, educational improvement networks more typically function as temporary organizations: newly-established relationships among hub organizations and members that collaborate over pre-determined periods of time on defined projects that sit outside the workflow and capabilities of the permanent organizations in which either resides. Moreover, these are often *dynamic* temporary organizations under constant reconstruction, as some members leave and new members join. Simply building the "organizational glue" that brings and holds hub organizations and members into relation as the network grows, matures, and evolves is a category of work unto itself, and prerequisite to actually doing improvement work within the network. In our analysis, the work of developing and managing the network as an organization as discussed by the hub leaders who we interviewed fell into four primary categories, with strong parallels to (and feedback on) the work of developing and managing the hub as an organization:

A. Building and managing network membership.
B. Developing and managing member.
C. Developing and managing the network as a formal organization.
D. Developing and managing the network as a social organization.
E. Supporting member leaders in establishing, maintaining, and "managing against" member-level visions, strategies, and agendas.

2.A. Building and Managing Network Membership: The work of developing and managing the network as an organization begins with hub leaders recruiting members and formalizing relationships with them. Members can include individuals (e.g., individual ELA teachers), groups or teams (e.g., the ELA faculty in an elementary school), or entire organizations (e.g., schools or districts). In our analysis, the work of building and managing network membership as discussed by the hub leaders who we interviewed includes:

- Recruiting new members (e.g., establishing relationships with potential members, managing application processes, and conducting readiness assessments).
- Designing, enacting, and renewing formal membership agreements (e.g., contracts or memoranda of understanding, fee structures, and funding arrangements).
- Establishing systems for monitoring network membership.

2.B. Developing and Managing Member Leadership: The work continues with hub leaders developing leadership teams in members as collaborators in developing and managing the network as an organization. These member leadership teams typically serve as the primary point of contact between the hub organization and members. They also have primary responsibility for enlisting and maintaining participation among staff members within their own organizations. Members can designate existing leaders or leadership teams as network leaders; members can also assemble new network leadership teams from scratch, with varying (if any) leadership

experience among team members. In our analysis, the work of developing and managing member leadership as discussed by the hub leaders who we interviewed includes:

- Devising designs and guidance for establishing and staffing member leadership teams.
- Building relationships with member leadership teams.
- Building shared understanding of (and commitment to) the network's overall vision, strategy, and agenda.
- Supporting the professional learning and development of member leaders via formal learning opportunities (e.g., training sessions), social learning opportunities (e.g., mentoring, coaching, opportunities for collegial learning), and individual learning opportunities (e.g., self-reflection).

2.C. Developing and Managing the Network as a Formal Organization: Again, as with any organization, another task is for hub leaders to collaborate with member leaders to develop and manage the network as a formal organization. The formal organization of a network can begin modestly: for example, with the establishment of formal processes for managing membership and developing distributed leadership as described above. As with hub organizations, the formal organization of the network can become increasingly elaborated over time to include formal structures, roles, routines, and technologies that establish, strengthen, and sustain collaborative relationships among the hub and members. In our analysis, the work of developing and managing the network as a formal organization as discussed by the hub leaders who we interviewed includes:

- Developing and managing contexts, routines, tools, participation structures, and IT platforms to support formal and informal communication, reporting, and coordination among the hub and network members.
- Establishing data sharing agreements, systems, and routines.
- Establishing systems of formal progress reporting, evaluation, and accountability.

2.D. Developing and Managing the Network as a Social Organization: As with developing the hub, a complement to the preceding has hub leaders collaborating with network leaders to cultivate participation among member staff and to socialize them to the understandings, values, and norms of the network. As temporary organizations, the participation of member staff in the network is not a given, nor is their identification with the understandings, values, and norms of the network, nor is their "buy in" to the vision, strategy, and agenda of the network. In our analysis, the work of developing and managing the network as a social organization as discussed by the hub leaders who we interviewed includes:

- Building and nurturing trust, positive relationships, commitment, and engagement within and among members and the hub.

- Establishing core values, norms, and language for the network as a whole.
- Building shared understanding of (and commitment to) the network's overall vision, strategy, and agenda.

2.E. Supporting Member Leaders in Establishing, Maintaining, and "Managing Against" Member-Level Visions, Strategies, and Agendas: Members are typically not subsidiaries under the formal authority of hub organizations but, instead, independent (and often voluntary) collaborators in the network as a temporary organization. As such, members may or may not have their own ambitions, approaches, and agendas that are in more-or-less alignment with those of the network and that can evolve independent of the network. As such, a key responsibility of hub leaders is to support members leaders in establishing, maintaining, and "managing against" a *member-level* vision, strategy, and agenda that aligns/coordinates with that of the network; that brings common identity and purpose to member staff; and that establishes identity and legitimacy among members' constituents and patrons, in their permanent organizations and environments. In our analysis, the work of supporting members leaders in establishing, maintaining, and "managing against" a coherent vision, strategy, and operating agenda as discussed by the hub leaders who we interviewed includes:

- Supporting member leaders in developing and articulating a member-level vision, strategy, operating agenda, and supporting rationale.
- Supporting member leaders in building shared understanding of/commitment to the member-level vision, strategy, and operating agenda.
- Supporting member leaders in aligning strategy and operations by prioritizing and coordinating among possible agenda items.
- Supporting member leaders in planning and running disciplined meetings coordinated tightly with the member's vision, strategy, and operating agenda.
- Supporting member leaders in maintaining clear communication and effective coordination among member leaders and staff.

3. Engaging in (and Supporting) Improvement Activity

Engaging in (and supporting) improvement activity distributed throughout the network is the core, technical work of the hub organization. This is work anchored in a fundamental dilemma. On the one hand, members often do not have sufficient capabilities to successfully engage improvement activity independently. That, after all, is one of the primary benefits of participating in an educational improvement network: i.e., overcoming limitations for independent improvement. On the other hand, hubs cannot successfully "improve" members any more than teachers can "learn" students. Rather, hubs can only succeed with-and-through members. A primary responsibility of hub leaders, thus, is to collaborate with (and to support)

member leaders both in developing and leveraging members' capabilities for improvement. In our analysis, the work of engaging in (and supporting) improvement activity as discussed by the hub leaders who we interviewed fell into four categories, some again paralleling the work of developing the hub and the network as organizations:

A. Assessing and developing formal organization for improvement.
B. Assessing and developing social organization for improvement.
C. Supporting, collaborating in, and engaging in iterative improvement activity.
D. Establishing, maintaining, and "managing against" a coherent vision, strategy, and operating agenda.

3.A. Assessing and Developing Formal Organization for Improvement: The work of engaging in (and supporting) improvement activity again requires that hub leaders collaborate with member leaders to further formalize the network: in this case, by developing the structures, roles, routines, and technologies to support the technical work of analysis, design, use, evaluation, and knowledge management. There is an analytical dimension to such work, in that there is likely variation among members in the development and coordination of these formal structures and resources. Moreover, this is also dynamic and ongoing work, as designs and needs for formal organization emerge and evolve in the context of improvement work. In our analysis, the work of assessing and developing formal organization for improvement among the hub leaders who we interviewed includes:

- Establishing basic educational infrastructure as a prerequisite to collaborative improvement work (e.g., coordinated instructional visions and aspirations, instructional designs, curriculum, instructional materials, assessments, assessments, coaching structures, etc.).
- Analyzing extant formal organization and discerning needs and requirements.
- Developing and managing contexts, schedules, routines, tools, participation structures, and IT platforms to support formal and informal collaboration, communication, and coordination in and among the hub and network members to support improvement work.
- Establishing measurement infrastructure within (and for use by) members, the hub, and the network as a whole.
- Establishing systems of formal progress reporting/monitoring, evaluation, and accountability for improvement activity and its outcomes in and among members.

3.B. Assessing and Developing Social Organization for Improvement: The work of engaging in (and supporting) improvement activity also requires that hub leaders collaborate with member leaders to develop elements of social organization: individual and collective capabilities, understandings, values, and norms that support the technical work of analysis, design, use, evaluation, and knowledge management. Again, there is an analytical dimension to such work, in

that there is likely variation among members in the development and coordination of social structures and resources. And, again, this is also dynamic and ongoing work, as the social organization in-and-among members and the network emerge and evolve in the context of improvement work. In our analysis, the work of assessing and developing social organization for improvement among the hub leaders who we interviewed includes:

- Building and nurturing trust, positive relationships, commitment, and engagement within and among members and the hub.
- Analyzing extant social organization and discerning needs and requirements
- Developing collective understandings, norms, and values as professional educators, including building understandings of a) the educational work of classrooms, schools, and districts and b) what it means to improve educational work.
- Developing understanding of, norms of, and capabilities for improvement work as the work of collaborative analysis, design, enactment/use, evaluation, and knowledge management.

3.C. Supporting, Collaborating in, and Engaging in Iterative Improvement Activity: This is where the rubber hits the road: the technical work of improvement. This is work that has hub leaders in multiple roles (e.g., analysts, designers, improvement coaches, and evaluators) working on their own and in collaboration with member leaders and member staff to understand and address problems, needs, and opportunities in improving the quality of (and reducing disparities in) students' educational opportunities, needs, and outcomes. In our analysis, the work of assessing and developing social organization for improvement among the hub leaders who we interviewed includes:

- Analysis (i.e., identifying and understanding problems, needs, and opportunities; establishing improvement aims; and developing working theories of improvement).
- Design in-and-among the hub organization and members.
- Using/enacting new tools, routines, and knowledge.
- Monitoring, evaluating, and reporting implementation, results, and progress in and among members.
- Knowledge management (i.e., capturing, consolidating, codifying, sharing, and leveraging new knowledge, both formally and socially).

3.D. Establishing, Maintaining, and "Managing Against" a Coherent Vision, Strategy, and Operating Agenda: This has hub leaders supporting members leaders (and member staff) in enacting improvement work in ways tight to broader network and member visions, strategies, and agendas. In our analysis, the work of assessing and developing social organization for improvement among the hub leaders who we interviewed includes:

- Building and maintaining understanding, buy in, and coordination around shared educational problems, aims, and approaches within and among members.
- Structuring and maintaining and operational agenda focused on disciplined improvement work.
- Conducting regular meetings with member teams around improvement activity.
- Maintaining regular contact with member leaders.
- Maintaining regular communication with all member staff.
- Focusing and following through on deliverables.

4. Managing Environmental Relationships

Educational improvement networks operate in complex environments: interests and organizations external to the network over which the hub and members have no formal authority. These environments include the permanent organization in which the hub organization and members are situated. They also include local stakeholders and constituents, funders and funding regimes, government organizations, policymaking organizations and policy regimes, the labor pool of potential hub staff, the pool of potential network members, collaborators, and competitors. These environments are a source of operational interdependencies, contingencies, constraints, and competition. They assess the legitimacy of (and accord value to) networks, their purposes, their identities, and their improvement approaches. They provide networks the resources they need to operate: hub staff, new network members, funding, knowledge, technologies, and time. They make assessments of whether or not (and how well or poorly) networks are accomplishing what they claim as their purposes, goals, and aims. In our analysis, the work of managing environmental relationships as discussed by the hub leaders who we interviewed fell into five categories, the first of which frames the rest:

A. Securing and managing funding.
B. Aligning with expectations, values, and priorities in environments.
C. Structuring and managing administrative relationships.
D. Building and maintaining social/political understanding and support.
E. Maintaining and leveraging “technical relationships” bearing on improvement activity.

4.A. Securing and Managing Funding: Among hub leaders, a first order matter is securing and managing the funding needed for the hub organization to exist and to operate and for members to participate. Again, networks are typically not institutionalized organizations with established funding streams, nor are either hubs or members typically located as established units or teams within the hierarchical and bureaucratic structures of educational organizations. That, in turn, requires constant attention to securing and managing funding, both internally (via contributions from the permanent organization of both hubs and members) and externally (via grants). In our

analysis, the work of securing and managing funding as discussed by the hub leaders who we interviewed includes:

- Identifying funding opportunities and writing grant proposals.
- Aligning a) multiple grants with each other and b) the purposes, identities, and aims of the hub, members, and networks with the agendas and priorities of funding agencies.
- Managing grant-related administration, including budgets, expenses, and reporting.
- Maintaining social/political relationships with funders, including building understanding and support, attending meetings and convenings, and managing expectations.
- Managing technical relationships tied to funding, including coordinating funding requirements/constraints with technical improvement activities, engaging in external evaluations, and reporting/publishing outcomes.

4.B. Aligning with Expectations, Values, and Priorities in Environments: Hub organizations and members do not unilaterally define their visions, strategies, and agendas but, instead, do so in interaction with the environments on which they depend. While this work begins with aligning with funding agencies as discussed above, the complex environments of hubs, members, and networks has the work stretching much further. In our analysis, the work of aligning with expectations, values, and their agendas in environments as discussed by the hub leaders who we interviewed includes:

- Discerning and aligning with the expectations, values, and priorities of *the hub's permanent organization*.
- Discerning and aligning with the expectations, values, and priorities of *members' permanent organizations*.
- Discerning and aligning with the expectations, values, and priorities of *community constituents of the hub, members, and their home organizations*.
- Discerning and aligning with the expectations, values, and priorities of *government and policymaking organizations*.
- Discerning and aligning with the expectations, values, and priorities of *broader society (e.g., as related to understandings of/expectations for quality and equity)*.

4.C. Structuring and Managing Administrative Relationships: Hub organizations and members often work in relationship with interests and organizations in ways that require coordinating administrative systems. This work begins, again, with funding agencies: for example, managing granted-related operations in ways that square with funders' requirements. But the work, again, often stretches much further. In our analysis, the work of structuring and managing administrative interdependencies with environments as discussed by the hub leaders who we interviewed includes:

- Interfacing/coordinating with the financial systems of permanent organizations of the hub and members.
- Interfacing/coordinating with the HR systems of those permanent organizations.
- Interfacing/coordinating with the data and information systems of the permanent organizations.
- Interfacing/coordinating with reporting, review, and oversight mechanisms of permanent organizations (e.g., annual progress reporting and reviews, IRB, etc.).
- Doing all of the preceding in relation to sub-contractors.

4.D. Building and Maintaining Social/Political Understanding and Support: As temporary organizations, hub organizations and members face the challenge of constantly building and maintaining understanding and support in environments. This work begins, again, with building and maintaining social/political relationships with funders. In our analysis, the work of building and maintaining social/political understanding and support with environments as discussed by the hub leaders who we interviewed goes further, to include:

- Developing and maintaining relationships with and among key constituents.
- Explaining/teaching/building understandings about the network and its work (and developing the language and framing needed to do so).
- Advocating, influencing, and maintaining "buy in" among key constituents.
- Communicating, publicizing, and "messaging about" the purpose, identity, and aims of the network.
- Providing evidence of the work and effects of the network.

4.E. Managing and Leveraging "Technical Relationships" Bearing Directly on Improvement Work: Hub organizations and networks often operate in partnership with other organizations that support, constrain, and place demands on the technical work of improvement. Managing these "technical relationships" begins, again, with funders: e.g., engaging in external evaluations and reporting/publishing outcomes. In our analysis, the work of managing and leveraging technical relationships as discussed by the hub leaders who we interviewed goes further, to include:

- Maintaining collaborative learning relationships with leaders in other networks.
- Aligning educational resources with state standards and assessments.
- Aligning measures, data systems, and reporting with state standards, assessments, teacher and leader evaluation requirements, etc.
- Acquiring and appropriating tools, technologies, research, and "best practices".
- Developing and leveraging relationships with expert researchers, practitioners, and thought partners.

- Coordinating improvement activity within the network with (b) other improvement activity and support partners working with institutional sponsors and with members.
- Knowledge sharing via change packages, tools, conferences, reports, publications.

Appendix D
Conditions that Complicate the Work of Hub Leaders

In our analysis, the conditions that complicate the core work of the hub leaders with whom we spoke fell into six primary categories:

1. Legacy Understandings of (and Approaches to) Educational Improvement.
2. The Novelty of Network-Based Educational Improvement.
3. Networks as Temporary Organizations.
4. The Professional Development and Learning of Network Leaders.
5. The Ambitiousness and Scope of Improvement Activity.
6. Network Demographics.

1. Legacy Understandings of and Approaches to Educational Improvement

Educational improvement networks emerge and operate in interaction with legacy educational environments famous for their fragmentation and incoherence and long content to privilege attention to educational form (i.e., the structure of educational organizations) over educational function (i.e., the work of teaching and learning). They also emerge and operate in interaction with institutionalized educational organizations (e.g., state agencies, district central offices, and schools) characterized by hierarchy and bureaucracy. Legacy understandings of (and approaches to) educational improvement that sit at the intersection of the former and the latter include efforts to produce more-and-better educational resources distributed more equitably among districts, with that then feeding the organization and management of instruction via a ubiquitous pattern of sorting, resourcing, and delegating.

These legacy understandings of (and approaches to) improvement are deeply institutionalized in schools, districts, and environments, and they serve as powerful (and often tacit) frames with which teachers, leaders, constituents, and patrons apprehend educational improvement networks and engage them in improvement work. At the same time, these legacy understandings and approaches have long contributed to distinguishing and dysfunctional characteristics common among public school districts, including fragmentation in instructional programs; a loose coupling between formal and behavioral structure; resistance to “top-down” improvement, and distrust and tension between leaders and teachers; norms of privacy and autonomy among teachers, and teachers’ routine cooptation of educational resources; and structural inequality in students’ educational opportunities, experiences, and outcomes.

In our analysis, complications that arise from these legacy understandings of (and approaches to) educational improvement as discussed by the hub leaders who we interviewed include:

- Unstable and faddish improvement agendas in districts, schools, and policy/funding environments, resulting in a) skepticism, resistance, compliance, and low-level engagement to improvement work and b) a toxic relational/professional/political infrastructure that inhibits collaboration.
- Understandings of external partners as "vendors" and "technical assistance providers" that do improvement work *for* districts and schools (and not *in collaboration with* districts and schools).
- Generally weak understandings, norms, and capabilities that cut against working in disciplined ways and in tight coordination with a stable agenda.
- The need to support members in "unlearning" old approaches to innovation and improvement in order to learn new approaches.
- Members simply not doing the work.
- Expectations in districts, schools, and environments for rapid improvement, despite all of the preceding.

2. The Novelty of Network-Based Educational Improvement

Educational improvement networks are novel organizational forms that work in interaction with evolving environments and districts in advancing educational excellence and equity. Indeed, collaborative, inter-organizational learning is not work that, historically, has been done much in-and-among schools, district, government agencies, and non-governmental organizations. Rather, "innovation infrastructure" supporting this type of practice-based educational innovation and improvement has only recently emerged in educational environments as a complement to more highly-developed impact, evaluation, and accountability infrastructures. Moreover, capabilities for continuous improvement have only recently been developing in districts and schools as a complement to more highly-developed, evaluation-and-accountability-driven approaches to performance management. Finally, among the new patterns of instructional and management emerging in districts, architectures that support operating as fully-functioning learning systems are the exception, and not the rule (as, for example, in Appendix A).

But it isn't only that educational improvement networks are novel. It is that *educational improvement is, itself, novel*: that is, improvement efforts focused keenly on instruction – the day-to-day work of teaching and learning – as the core educational function of schools. Indeed, educational improvement networks are emerging and operating in interaction with evolving educational environments pressing for (and pursuing) excellence and equity in the core educational function of schools: teaching and learning. They are also emerging and operating in interaction with many districts that are heeding that press and themselves evolving as instructionally-focused education systems, with central office and school leaders collaborating with teachers to organize and manage classroom instruction in pursuit of excellence and equity.

The evolution of environments and districts is characterized by variety, both in the policy logics driving the pursuit of excellence and equity and in districts' approaches to organizing and managing instruction

In our analysis, complications that arise from novelty of network-based educational improvement as discussed by the hub leaders who we interviewed include:

- Weak educational infrastructure in members and in their permanent organizations (e.g., visions and design for high quality instruction, and coordinated formal and social resources to support those visions).
- Weak data infrastructure and data sharing policies/agreements in members and their permanent organizations.
- No relational trust, supporting norms, or common language of improvement among teachers, leaders, network constituents, and network patrons, nor positive experience working productively together in organized, goal-directed ways.
- Low initial "absorptive capacity" that complicates learning and using new approaches to collaborative, continuous improvement (as well as leveraging new knowledge and tools as they emerge within the network).
- The need to show respect for (and deference to) the initial capabilities of members to maintain buy-in and commitment, even if their capabilities are lacking and problematic.
- Variation in initial formal structure, social structure, and technical capabilities among members, thus the need to balance the practical need for differentiated support among members with the political need to provide equitable support among members.
- Variable understandings of (and the lack of consensus on) improvement approaches in environments, as well as the lack of a highly developed knowledge base and associated technical resources in environments.
- The lack of a labor pool in environments skilled and experienced in collaborative learning and improvement.
- Little understanding of the time demands of improvement work in members and environments, crossed (again) by expectations for quick results.
- The hub shouldering too much of improvement work (vs. developing and leveraging improvement capabilities in members).

3. Networks, Hubs, and Members as Temporary Organizations

Educational improvement networks often function as temporary organizations characterized by newly-established, time-delimited, at-will relationships among hubs and members; a focus on defined projects, tasks, and objectives; and capabilities beyond those of the "permanent" organizations in which they reside. Moreover, the hubs and members that comprise networks are

often times, themselves, temporary organizations. With that, networks, their hub organizations, and their members often lack the established legitimacy, authority relationships, and resource flows of the institutionalized, hierarchical, bureaucratic "permanent" organizations that make up the K-12 governance structure and that populate educational environments.

That, in turn, requires formidable organizational development of the hub, members, and network in order to engage the novel work of collaborative, inter-organizational learning and improvement. It also puts them in complex relationships with permanent organizations and educational environments in which novel, varied approaches to advancing educational quality and equity co-exist with legacy understandings of (and approaches to) innovation and improvement that reinforce the status quo.

In our analysis, complications that arise from networks, hubs, and members as temporary organizations as discussed by the hub leaders who we interviewed include:

- Managing a split identity and dual loyalty, as hub leaders, member leaders, and their staff work simultaneously in the network and in their permanent organizations.
- The lack of the hub organization's formal authority over members, and the need to cultivate and leverage informal influence.
- Needing to work continuously to establish and maintain identity, legitimacy, and resources in-and-from their permanent organizations and environments.
- The constant need to buffer the work of hub leaders, member leaders, and their staff from additional (and sometimes contrary) demands on their time from their permanent organizations and environments.
- The constant need to buffer the work of hub leaders, members leaders, and their staff from understandings and approaches to improvement in their permanent organizations and environments that run counter to those of the network (and to align with that which can't be buffered).
- The constant risk that members will lose their identification with the vision, strategy, and agenda of the network.

4. Professional Development and Learning of Hub Leaders

The combination of complicating legacy conditions, the novelty of educational improvement networks, and their status as temporary organizations have hub leaders engaged in work categorically different from that of conventional educational administrators and leaders in permanent, institutionalized K-12 educational organizations. Despite this complexity, hub leaders work absent institutionalized loci of professional preparation and development; absent standards of program accreditation, preparation, certification, and practice; and absent

established research or professional organizations as producers and stewards of a practical or theoretical knowledge base.

Indeed, none of the hub leaders with whom we spoke reported a career trajectory that focused specifically on pre-professional and professional development as a network or hub leader. Rather, among those with leadership training and experience before assuming responsibilities as a hub leader, our respondents reported having general leadership training and experience: in some cases, via graduate programs in educational leadership and subsequent leadership positions in schools or districts; and, in other cases, as garnered via experiential learning in the context of their professional work as professors, designers, coaches, and evaluators.

In our analysis, complications that arise from weakness in the professional development and learning of hub leaders as discussed by the hub leaders who we interviewed include:

- The need to "lead while learning", and to manage the dual identities of leader and learner.
- The need to self-construct and coordinate a bricolage of professional learning opportunities available in their environments.
- The challenge of carving out time to sustain social/collegial learning opportunities among the hub leadership, within the hub organization, and with hub leaders in other networks, given the demanding nature of their work.
- The time demands of (and low return on) participating in leadership learning networks, many of which function as "sharing networks".

5. The Ambitiousness and Scope of Improvement Activity

The value of educational improvement networks derives, in part, from collaborating to solve complex, systemic problems that are beyond the capabilities of individual members. Even so, hub leaders with whom we spoke described all of their work as becoming more complicated as the ambitiousness and scope of improvement activity increased. More complex problems embedded in more complex systems require more complex improvement activity, more complex member organizations, more complex hub organizations, more time and resources, and more complex interactions with environments. Left unchecked, the ambitiousness of improvement activity functions as an exacerbating condition that amplifies complexity along all other dimensions.

6. Network Demographics

The value of educational improvement networks also derives from supporting improvement at scale, in large numbers of schools, and sustaining that improvement over time. Even so, hub

leaders with whom we spoke described doing so as becoming more complex as their "network demographics" (i.e., the organizational make-up of the network) became more complex. The demographics included: the size and functional specializations of the hub; the number of members, and variation in their initial capabilities; the geographic distribution of the hub and members; the pace of network growth; and transiency among members, member staff, and hub staff. Rapid recruitment and high levels of transience among more members distributed across greater distances spreads the attention of the hub thin; decreases opportunity for contact and support from the hub; complicates monitoring member development and improvement activity; slows the pace at which new knowledge and tools can be incorporate and used through the network; and increases and diversifies the environmental relationships that need to be managed. Again, left unchecked, network demographics function as exacerbating conditions that amplify complexity along all other dimensions.

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