

LEADERSHIP IN PRACTICE

A New Paradigm to Effectively Achieve Convergence Research: Activation of Multicontext Theory

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Effective leadership is achieved by enabling relationships, promoting connection to an overall purpose, and promoting a culture of innovation. This paper provides a solid framework to enable effective STEM leadership through scientific research, specifically enhancing convergence research (CR) efforts. Efforts to grow CR programs as a means of solving persistent scientific challenges have become more prevalent. The conventional approach to CR involves identifying a problem, bringing together researchers, engaging in individual discipline-specific research, and then combining the individual research to create a solution. However, CR is highly complex, requiring longer-term adaptability that may be challenging to achieve with individuated, principal investigator-driven research efforts that are simply merged to achieve collaboration.

A new paradigm to enhance CR efforts, thereby promoting STEM leadership, is presented that activates a Multicontext Theory (MCT) framework. MCT provides a balance between discipline specific, task-oriented activities and systemic, process-oriented activities. Examples are presented in this paper for the typical challenges experienced in CR and the use of MCT to improve CR. Activation of MCT will create an environment to address complex, transdisciplinary research and spark systemic changes that are more conducive to CR efforts while also broadening participation and enhancing leadership in STEM research.

Leadership in Science, Technology, Engineering, and Math (STEM)

Numerous papers have been published to focus on leadership under a variety of circumstances and venues, e.g. during crises, in the classroom, or as an administrator of programs, among others. Few papers address the type of leadership that is required to achieve true success in STEM research and the institutional change that is required, especially in solving the most intractable problems that currently face society. Characteristics of effective academic leaders in general are ones that exhibit effective decision-making and

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enable follow up actions to promote and achieve the institution's mission of providing quality educational experiences (Rankins & Rankins, 2024). Although there are many basic traits that STEM leaders should possess in terms of communication and technical knowledge, additional traits that are recognized as important in STEM leadership include the abilities to be creative, promote innovation, adapt to change, and encourage team building and collaboration (National Academy of Engineering, 2005). Engaging in convergence research (CR) *"entails integrating knowledge, methods, and expertise from different disciplines and forming novel frameworks to catalyze scientific discovery and innovation"* (Arnold & Greer, 2016) and enables individuals to be successful STEM leaders. However, the current academic culture contains barriers to achieve the transdisciplinary approaches needed for successful CR. A holistic framework that incorporates social dynamics, research processes, and institutional dynamics is needed.

Leadership Positionality Statement

Jean Andino is an African American, Puerto Rican woman who is a chemical engineer doing environmental engineering (air pollution) research in her current role as a tenured Associate Professor at Arizona State University. She has been highly successful in earning nationally competitive research grants and holding significant leadership roles in research efforts of all sizes, with multiple millions of dollars in research funding and prominent national research honors earned. Dr. Andino's lived experiences, particularly in bringing her multifaceted engineering interests into leadership roles for large science and engineering research efforts have allowed her to see that true leadership and success at the convergence research scale require a change in mindset and actions that include but also go well beyond achieving pure discipline-specific science and engineering excellence. This lived experience motivated the idea of applying Multicontext Theory to improve convergence research.

Roberto Ibarra is an Associate Professor Emeritus in Sociology at the University of New Mexico, and an Assistant Vice Chancellor Emeritus at the University of Wisconsin-Madison. He is a Latino American male, and the primary social science investigator in a study of undergraduate students in a STEM research program that was a foundation for this paper. He has spent more than 50 years as a faculty member and administrator in higher education where he discovered and developed the Multicontext Theory model.

Gary Weissmann is a White male retired professor of hydrology and geology. He has benefited from the privilege associated with this background. He contributed significantly to the fields of groundwater hydrology and fluvial sedimentology, and he has led workshops and given several presentations on conducting science and on Multicontext Theory. He has been committed to finding ways to increase diversity in STEM throughout his career.

Framing the Challenges

Numerous documents have been written to describe the essential features of CR (Arnold & Greer, 2016; W. Bainbridge, 2016; W. S. Bainbridge & Roco, 2016; DeSimone & Farrell, 2014; National Science Foundation (NSF), n.d.; Peek et al., 2020; Roco, 2019, 2020; Roco & Bainbridge, 2013). A seminal document from the National Academies (National Research Council (U.S.) et al., 2014) and a follow up workshop with proceedings (Division on Earth and Life Studies & National Academies of Sciences, Engineering, and Medicine, 2019) outlined the essential features of CR as the:

1. inclusion of different individuals from multiple disciplines in order to address a large societal need,
2. valuing of diverse voices,
3. creation of a culture of convergence with appropriate supporting structures,
4. provision of physical space to support conversations and collaboration, and
5. fostering of partnerships.

Despite articulation of the essential features of CR (Arnold & Greer, 2016; W. Bainbridge, 2016; W. S. Bainbridge & Roco, 2016; DeSimone & Farrell, 2014; National Science Foundation (NSF), n.d.; Peek et al., 2020; Roco, 2019, 2020; Roco & Bainbridge, 2013), as well as methods that some project teams have employed to achieve specific elements of CR (Division on Earth and Life Studies & National Academies of Sciences, Engineering, and Medicine, 2019; National Research Council (U.S.) et al., 2014; Westerhoff et al., 2021), numerous institutional and individual challenges exist in achieving true convergence in research on a broader scale (Arnold & Greer, 2016; W. Bainbridge, 2016; W. S. Bainbridge & Roco, 2016; DeSimone & Farrell, 2014; National Research Council (U.S.) et al., 2014; National Science Foundation (NSF), n.d.; Peek et al., 2020; Roco, 2019, 2020; Roco & Bainbridge, 2013; Westerhoff et al., 2021). For example, most universities and research programs are divided into disciplines that value discipline-specific, time-limited, linear-logical grants, publications, and operating mechanisms. This culture tends to promote individuated principle investigator (PI)-curiosity-driven science rather than community-driven science. Thus, a dissonance in the academic culture exists that inherently disadvantages the attainment of true CR. A new paradigm that activates a culture of convergence in research that goes beyond consideration of primarily academic fields while still maintaining disciplinary expertise is needed to transcend the identified challenges and enable the coalescing of social, research, and systemic approaches that are needed to achieve impactful CR.

The identified challenges suggest that teams and centers that are currently classified as undertaking “CR” may be operating more as mere collaborative research teams that are characterized by a “baton-passing” mode of functioning under the umbrella of a large scientific challenge, i.e. one that is linearly sequential, individuated, and passes results from one research group to the next rather than as a truly integrated CR team. While some aspects of the CR process have been addressed in publications, most outcomes of CR remain as outputs of the discipline-specific, task-oriented elements of the research. Historically, it is the research aspect of convergence that is most evident, but social and systemic issues are essential elements to enabling the stability and growth of CR.

A New Paradigm to Achieve Convergence Research

Multicontext Theory, abbreviated as “MCT” (Ibarra, 2001), when activated by researchers, becomes an effective framework to broaden the current academic approaches and enable project groups to reach the full potential of CR. MCT is a multidimensional institutional culture change model that can guide all aspects of CR, from initial research question development to inclusion of all voices in developing research approaches and ultimate dissemination of the work product. The activation of MCT (Ibarra, 2001) in CR is a transformative approach that will impact not only the scientific community but the operations of academic institutions and society as a whole. MCT activation in CR provides a framework to transcend individual principal investigator-driven research and ascend to community participatory research, a transformation that is critical for the development of effective solutions to society’s most intractable problems.

The essential elements of MCT have been described in detail elsewhere (Ibarra, 2001; M. Z. Moore, 2020; Pfeifer et al., 2021; G. Weissmann & Ibarra, 2021; G. S. Weissmann et al., 2019). MCT specifically addresses how people interact and associate with others, how they tend to use space, allocate time for activities, gather information, learn, and relate to large scale institutional culture – all essential sources of CR challenges. The ways of knowing and doing are characterized within MCT as Low Context (LC) and High Context (HC), although the words “low” and “high” are used without placing judgment on their relative importance since both may be important, depending on the situation. LC approaches tend to be individuated, time-sensitive, task-oriented, compartmentalized (e.g., disciplinary-focused), and value linear-logical reasoning. HC approaches tend to be community and connection-focused, process-oriented, transdisciplinary, systems-focused, and value non-linear thinking (Ibarra, 2001; M. Moore, 2023; M. Z. Moore, 2020; Pfeifer et al., 2021; G. Weissmann & Ibarra, 2021; G. S. Weissmann et al., 2019).

Over 20 faculty and student workshops on MCT have been conducted by two of the authors of the current paper. Evaluations of the effectiveness of the workshops have resulted in numerous stories of the impacts of even just the knowledge of MCT. One faculty MCT workshop participant described

how MCT broadened his approach to research. Before the MCT workshop, the faculty member saw himself as a microbiologist who focused on “good” versus “bad” germs related to human health. After the MCT workshop, the faculty member adjusted his way of addressing his work. Instead of using the low-context approach to simply focus on the germs, the faculty member reframed the work to use a high-context, systems approach for understanding their topic within the human health field. Specifically, the faculty member considered a biofeedback system analysis approach to more thoroughly explore the interconnectedness of the work. Taking a high-context approach led to reportedly greater innovation in the person’s research. In addition to impacting individual faculty research approaches, MCT has previously been shown to be beneficial in valuing and empowering the persistence of historically underserved students in STEM (M. Moore, 2023; M. Z. Moore, 2020; G. S. Weissmann et al., 2019, 2019). Pfeifer et al. (2021) adjusted their program for undergraduate research to include MCT concepts and found that the MCT approach helped the participating students thrive while conducting their summer research. Specifically, students in this program made measurable gains in concept comprehension, field and analytical competencies, and research abilities when offered a Multicontexted approach to research. Another published study (M. Z. Moore, 2020) documented how the activation of MCT in education resulted in students feeling a stronger sense of belonging in STEM. The past evidence of individual activation of MCT suggests that MCT activation to specifically promote CR may have the benefits of not only enhancing STEM leadership by creating effective CR, but also broadening participation, promoting diversity, and enabling inclusion in STEM.

Based on MCT concepts, specific examples of implementation challenges for CR may be grouped into three major categories (see [Table 1](#)). These are (1) academic systems, i.e. the institutional culture that enables the conduct of research, (2) research processes, i.e. information sharing and learning processes, and (3) social dynamics, i.e. person-to-person interactions, group associations, and use of space and time.

[Table 1](#) provides a description of LC and HC modes within the three main categories of importance in CR. Multicontexted (MC) approaches are ones where there is an automatic switching between LC or HC approaches or where mixed LC and HC approaches are used, and the choice of which to use is governed by the circumstances and desired outcome. Traditionally, academic culture primarily uses and values LC ways of knowing and doing while devaluing HC ways of knowing and doing (Ibarra, 2001; M. Moore, 2023; M. Z. Moore, 2020; G. S. Weissmann et al., 2019). A MC approach that values both the LC and HC, and recognizes that the context of the situation is important to determining whether operating under either LC, HC, or mixed LC/HC modes is important for successful CR. MCT, when activated (i.e. intentionally used), enables individuals and units to appropriately recognize different ways of knowing and doing, value those

multiple modes, and understand when those modes may be most effectively implemented. Moreover, activation of MCT enables institutional change. Because HC orientation embraces community building values that are necessary in CR, additional opportunities open for trailblazing research leadership roles by individuals who embrace MC approaches.

The unique aspect of adopting the MCT framework to CR is that the MCT framework addresses all three essential categories of CR, and activation of MCT enables unique approaches to handling the multiple either overt or hidden challenges of CR. Examples of potential MC strategies are presented in [Table 1](#) for each of the challenges that have previously been identified in the three broad CR categories. It is, however, important to note that activation of MCT and generation of MC strategies beyond those that are listed in [Table 1](#) are possible and likely. The general approach to activating MCT and generating new strategies would consist of a basic four step process that would incorporate feedback and refinement. Specifically, the process would involve: (1) establishing the large societal issue that a CR team will address, (2) assembling a potential team that is open to the co-generation of research, 3) training to introduce participants to MCT, and (4) activating MCT through introduction of the Question Formulation Technique, abbreviated as “QFT”, (Right Question Institute, n.d.; Rothstein & Santana, 2011) or a similar facilitation technique with modified MCT-focused steps. Each of the 4 steps would be re-examined periodically in a timeframe that is most conducive to the functioning of the team and the overall attainment of the final societal impact-oriented goals of the team.

The QFT facilitation method was originally established by members of the Right Question Institute to empower communities to develop and ask their own questions (Right Question Institute, n.d.). The key element of the QFT is generation of a large number of questions surrounding a specified prompt, without any pre-judgement about the questions themselves. Once the questions are generated, the QFT provides a process by which the questions can be prioritized and placed into actionable plans. By activating MCT within a QFT approach, we suggest that teams would be guided to consider the social, research, and systemic issues and changes that would be needed to enable solutions that are adaptable to future scenarios. Modification of the QFT with an MCT approach would involve two steps following the basic QFT process: (1) deciding and reflecting on LC, HC, and MC modes to address the social, research, and systemic issues and changes that are associated with the questions, and (2) determining how the use of LC, HC, or MC approaches might change the outcomes when addressing the questions. Inclusion of MCT in the QFT process enables the HC-orientation of co-generating ideas and maintaining process orientation while simultaneously maintaining the disciplinary focus of LC approaches. These modes are critical for successful CR. Importantly, the MCT + QFT

facilitation approach would allow all voices in the room to be heard while developing questions and research approaches to scientific co-creation (an HC process).

The proposed additions to the QFT process are expected to enable activation of MCT in developing the CR approach. It is important, though, that the process be enacted in the three basic areas of social, research, and systemic issues, and that connections/links be established between the three fundamental aspects. Guiding the discussion of the major questions around the three basic areas of CR is expected to enhance discussion of how researchers are carrying out their work, thereby activating MCT and elevating the outcomes.

As seen in previous work (Pfeifer et al., 2021), even simply having an awareness of MCT promotes a reframing of concepts to better promote understanding and inclusion of different viewpoints. Having discussions that involve people of different backgrounds would also promote discussions between teams of people that might not necessarily communicate spontaneously. Moreover, in the discussions, the person who can effectively couple LC and HC concepts, i.e. they embrace a MC approach, would likely be elevated in the discussions to a research leadership role. This elevation could translate into new research leadership opportunities for individuals that have historically been underrepresented in national STEM leadership.

Conclusions

Although CR is growing in importance, numerous challenges exist. This paper introduces the activation of MCT in the development of CR and provides a broad framework for activating MCT to address many of these challenges. Because current academic culture is dominated by using primarily LC approaches, MCT provides a more balanced approach for successful CR. As was seen in projects that introduced MCT training, even an awareness of MCT resulted in a re- thinking of approaches and the inclusion of additional voices in STEM research. An inherent benefit of activating MCT is that the MC approaches may attract more diverse populations into STEM (Ibarra, 2001). An example of how MCT may be activated is provided. This approach of incorporating MCT into the QFT process may result in highly impactful outcomes since new questions and new, unexpected research may be initiated. The adoption of true CR will also encourage broader discussions across disciplines and communities, thereby enabling institutions to achieve new dimensions of research and societal impact while simultaneously promoting STEM leadership.

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Jean M. Andino, PhD is currently an Associate Professor of Chemical Engineering at Arizona State University (ASU). Her research focuses on atmospheric chemistry and air pollution control. She has held leadership roles in multiple multi-million dollar projects over her career, including currently being the Director and Principal Investigator of the National Science Foundation-funded Western Alliance to Expand Student Opportunities (WAESO) Louis Stokes Alliance for Minority Participation (LSAMP) program, Principal Investigator of the US Environmental Protection Agency-funded Air Pollution Control for Resilience project, and Deputy Director of the Department of Energy-funded Southwest Integrated Field Laboratory (SW-IFL) project that focuses on heat resilience and air chemistry. She is currently the only mainland-US born Afro-Latina in a tenured engineering faculty position in the US, the first woman of color to be tenured and promoted to Associate Professor in the University of Florida College of Engineering, and the first African American woman or Afro-Latina to receive a PhD from the California Institute of Technology.

Roberto A. Ibarra, PhD is an Associate Professor Emeritus in the Department of Sociology at the University of New Mexico and an Assistant Vice Chancellor Emeritus at the University of Wisconsin-Madison. His primary research has been engaged with organizational cultural change and diversity in higher education. He has been involved with the WAESO LSAMP program headquartered at Arizona State University in various ways as an evaluator and researcher and has co-conducted workshops since 2015.

Gary Weissmann, PhD is a retired professor from the Department of Earth & Planetary Sciences at the University of New Mexico. His research focuses on aquifer characterization and fluvial sedimentology, but over the past 10 years, he has been working on issues related to diversity and inclusion in STEM.

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Table 1. Issues, Challenges, and Multicontextual Approaches in Convergence Research^A

	Issues in Convergence Research	Challenges to Convergence Research	Low Context Approach	High Context Approach	Multicontext Blending Strategies and Techniques to Enhance Convergence Research
Academic Institutional Systems: Institutional Culture Designed to Conduct Research	The institutional valuation of traditional disciplinary and transdisciplinary pursuits and the depth of expertise greatly impacts convergence.	An incompatibility conflict may exist between individual PI-curiosity-driven scientific questions and community-based and developed (e.g., applied) questions (Division on Earth and Life Studies & National Academies of Sciences, Engineering and Medicine, 2019).	PI-curiosity-driven research is more valued, so projects may be focused on PI-driven questions that are detailed and may be only indirectly related to community/societal needs.	Community/society relevant (applied) research is valued, so questions and projects are developed by the community and stakeholders, and PI expertise is brought in to contribute, not necessarily lead.	Use-inspired research should be an institutional aim to enhance CR (a HC mode). Facilitating and valuing exchanges that enable faculty PIs to engage with community members to develop research questions should be encouraged.
		Faculty development and promotion structures emphasize individuated, discipline specific research rather than transdisciplinary efforts (Division on Earth and Life Studies & National Academies of Sciences, Engineering and Medicine, 2019).	LC advancement focuses on individuals and is based on disciplinary reputation through large numbers of publications and grants in one's own discipline.	HC advancement focuses on group efforts and systems level thinking. Fewer, more directed publications and grants may address the problems from different angles. Publications might require more relevant venues to disperse results to a wider community affected by the results.	Promotion and tenure requirements need to be broadened to include HC-type processes, including publications, community work, and activities. These may be applied projects, publications in focused or applied journals, community-centered reports, community outreach and involvement, and small grants to a community. Positive impacts with community should be included.
		Leadership roles in CR must be shared amongst participants, including community members.**	Discipline experts are leaders.	Transdisciplinary communicators are leaders who may not be a researcher but may be a community member.	Encouraging HC-oriented leaders who see the larger picture of the project may result in more effective CR.
		Funding challenges, particularly in terms of evaluating transdisciplinary efforts (Division on Earth and Life Studies & National Academies of Sciences, Engineering and Medicine, 2019).	Reviews sent to disciplinary experts who can only rate a portion of a grant proposal; however, individuals who lack expertise in other areas may give proposals a lower ranking. Additionally, proposals are sent to individuals for review without much interaction between disciplinary experts for discussion of the full breadth of the proposal.	HC approaches would evaluate proposals in a holistic fashion.	Requests for proposals and the subsequent reviews of the proposals should bring disciplinary and community experts together for systems-level HC discussions contained in a proposal. This approach might be time consuming but process-oriented.
Research Processes: Information Sharing and Learning Processes	How information is shared between disciplinary groups influences convergence research success.	The approach to convergence may be different given what programs and individuals value.**	"Baton passing" (e.g., information passed from one discipline to the next) is preferred. Disciplinary groups are responsible for specific tasks related to their discipline.	Co-generation is preferred. All disciplinary groups and communities are partially involved in most tasks.	In transdisciplinary work, the HC approach to co-generation of ideas is critical in order to maximize efforts and create transdisciplinary connections. Therefore, a co-generation approach to research, where all parties are involved in most tasks, requires regular facilitated meetings to define the problems and develop research approaches where all stakeholders and researchers are involved.
	The way people learn new information may inform	Traditional academic research tends to focus on the detailed elements without considering the larger system (Roco &	LC-oriented people tend to focus on specific attributes of parts of the system, often out of context of the system where these components exist.	HC-oriented people tend to focus on connections and interrelationships between system parts, where understanding the context of system parts within the system is	Holistic thinking in terms of problem framing, analyzing, and interpreting results are needed for successful convergence research (W. S. Bainbridge & Roco, 2016; Roco, 2019; Roco & Bainbridge, 2013). Thus, training in both induction, e.g., from nanoscale analysis

	transdisciplinary cross-over of ideas, concepts, and technology.	Bainbridge, 2013; W. S. Bainbridge & Roco, 2016; Roco, 2019).		critical. The complexity of the system is embraced.	to macroscale findings (an LC approach), and systems hierarchical deduction, e.g., macroscale societal goal-driven science and technology to microscale analysis (an HC approach) are necessary (Roco, 2020).
		Current student and faculty training limits opportunities to work with individuals from different backgrounds and academic disciplines (Finn et al., 2022).	LC training emphasizes focus on disciplinary expertise, often ignoring cross-disciplinary influences.	HC training values transdisciplinary work that encourages building relationships with others from widely varying disciplines, including fields outside of STEM.	Convergent research requires knowledge in multiple fields and methods (e.g., a HC approach), thus training needs to include transdisciplinary expertise and focus while retaining disciplinary expertise (Finn et al., 2022).
Social Dynamics: One-on-one Interaction, Group Association, Use of Space and Time	Understanding how people interrelate and communicate concepts is critical for large group and community-based research.	Lack of faculty exchange across disciplines, especially outside administrative roles (Division on Earth and Life Studies & National Academies of Sciences, Engineering and Medicine, 2019).	LC culture is firmly divided into disciplinary departments. Faculty typically only interact with others in their department.	HC-oriented faculty will seek to interact with others in different disciplines who may enhance their research.	Space and opportunities are necessary for researchers from different fields to interact. A balance of both is needed. Possible venues may be "convergence conferences", where researchers and stakeholders join together to develop research questions and approaches (HC approaches that possibly use QFT facilitation).
		Different interpersonal communication approaches can create mis-understandings.**	LC-oriented people tend to focus on the importance of words, so language used may seem blunt and direct to HC-oriented people.	HC-oriented people tend to focus on the context of the situation during discussions, interpreting body language, voice tone, and facial expressions as much as words.	Using the MCT language to discuss interpersonal communication approaches will help alleviate misunderstandings. Also, defining the ultimate goal of the convergence research project will guide merging of different interpersonal communication approaches.
	Associations are important in terms of determining how groups operate and what the expectations are for participants.	Language use and jargon in different disciplines may create communication challenges (Petersen et al., 2021).	LC communication is used to transmit information as researchers learned in their discipline. Disciplinary language used by LC-oriented people may exclude others outside their field. LC disciplinary communication needed to share information in the discipline (e.g., presentations, manuscripts).	HC communication used to build connections, so HC-oriented researchers will make efforts to be sure communication works between disciplinary groups.	Convergence research group communication should focus on building HC connections and transdisciplinary language and understandings, avoiding disciplinary language and jargon whenever possible. In manuscripts, presentations, and proposals, introductions to work may need the HC language to explain the LC findings in the disciplinary presentation.
		Focus on tasks versus the process of research may create disagreement within the CR team.**	LC-oriented people tend to be task oriented, focusing on completing tasks for individual disciplines. They also tend to focus on conclusions.	HC-oriented people tend to be process oriented, focusing on the process of transdisciplinary work. Conclusions are important but the process to get conclusions ensures transdisciplinary coordination and connection between participants.	LC task orientation is needed to push projects to completion; HC process orientation is needed to help all participants feel included and to guarantee transdisciplinary connections. Professional facilitation that activates MCT concepts at CR project meetings can guarantee that the process (HC) is as important as the conclusions (LC).
	How space is arranged and used can impact the effectiveness of convergence research.	Configuration and availability of space is needed that encourages transdisciplinary conversations (Division on Earth and Life Studies & National Academies of Sciences, Engineering and Medicine, 2019).	LC space has boundaries, often divided into hierarchy of rank and by discipline. Focused disciplinary space used for in-depth analysis.	HC space has fewer boundaries and is more communal in order to build relationships.	Some space is best suited for LC focused work, but HC communal workspace is needed to build transdisciplinary connections. Shared transdisciplinary workspaces that allow interactions between researchers and stakeholders may promote greater interaction (Facilitating Interdisciplinary Research, 2004).
	How groups manage and value time is	Developing convergence research takes time since different fields must come	LC time is a commodity, so this additional time may be seen as a waste of time and inefficient. LC approaches to time push the	HC time is a process, and this additional time is to build trust and connections with others.	Staged research funding (e.g., funding for team development, pilot projects, and ultimately the large-scale project) may be required for relationship-building and question/research approach development

	critical to group performance.	together, and transdisciplinary and community connections are needed (Division on Earth and Life Studies & National Academies of Sciences, Engineering and Medicine, 2019).	work to be sure conclusions are reached.		prior to submitting a formal research proposal in order to conduct the work in a connected manner (Division on Earth and Life Studies & National Academies of Sciences, Engineering and Medicine, 2019). This scaffolded MC approach likely takes significantly more time than traditional projects.
		Diverse ways exist in how people perceive time, potentially creating disagreements in large groups conducting convergence research.**	LC-oriented people perceive deadlines as strict, and completion by the deadline is more important than the completeness of work. Additionally, being prompt and on schedule is important.	HC-oriented people perceive deadlines as goals to be achieved, and it is more important to complete work with accuracy even if it takes longer than arbitrary deadlines. Being prompt is important if promptness is important to others. Schedules are goals to be achieved but completion and accuracy of the task is more important than the schedule.	Determine whether deadlines are arbitrary or not. Deadlines that are not arbitrary but are strict, and schedules related to these deadlines, may need LC push; however, deadlines and schedules that are artificially imposed may need revision if the process is not completed accurately (HC-mode). Develop flexible timelines to allow for both LC and HC modes to be realized, allowing time for meetings to take longer than scheduled in order to complete tasks.

^ATable Note: Issues and challenges in convergence research are identified in the general categories of social setting, research setting, and academic institutional systems. For each issue and challenge, the Low Context (LC) and High Context (HC) approaches to answering the challenge are identified. The Multicontext (MC) blending strategies indicate how Multicontext Theory (MCT) may be activated to better answer the Convergence Research (CR) challenges, thus leading to successful CR. Key: recognized challenges for successful CR include references; unrecognized challenges for successful CR are labeled as **.

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