

Roundtable on Mentorship, Well-being,
and Professional Development
(RT-MWPD)

Framing Document

(as of October 31, 2023)

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Purpose and Description

The purpose of this Framing Document is to help elucidate the goals, definitions, and approaches of the Roundtable on Mentorship, Well-Being, and Professional Development. Building from the Roundtable’s Statement of Task (see Box 1), we—the members of the Roundtable—have herein provided a framework that will guide the critical conversations, explorations, and engagements that we will pursue during our work together. While the primary purpose of this document is to help frame the work of the Roundtable members, we also recognize the utility of this document for others. The definitions and approaches described are intended to stimulate new modes of engagement and innovations around mentorship, well-being, and professional development. All members of the STEMM research ecosystem (see Box 2) can benefit from the concepts discussed in this document.

Box 1

Roundtable Statement of Task

The National Academies of Sciences, Engineering and Medicine will create and operate a Roundtable on Mentorship, Well-being, and Professional Development to explore the on-going improvements and innovations in effective mentorship and professional development practices and programs, and how to create and maintain an inclusive and equitable higher education and STEMM research ecosystem. In particular, the Roundtable will focus on the role of identity, inclusion, personal agency, and well-being (e.g., mental, financial, social, etc.) in mentoring relationships and career development of graduate students and postdoctoral scholars in STEMM.

The Roundtable will:

- Convene a broad array of exemplary mentors, academic leaders, graduate students and postdoctoral scholars, scholars of mentorship (including those outside of STEMM), public and private funders, and professional societies;
- Compile and present quantitative and qualitative data relevant to the professional development, mental health and well-being, and mentorship of graduate students, postdoctoral scholars, and faculty in STEMM;
- Highlight current practices and emerging strategies to improve the representation, retention, advancement, inclusion, and well-being of graduate students and postdoctoral scholars, particularly for members of

marginalized and historically excluded populations in STEMM, through mentorship and other supportive practices;

- Explore the connections between effective mentorship, well-being, personal agency, and career development, particularly for members of marginalized and historically excluded populations in STEMM, as well as novel ways to establish and sustain these connections; and
- Advance discussions to encourage systemic change for a more equitable and inclusive experience for graduate students, postdoctoral scholars, and faculty in STEMM.
- The Roundtable may organize workshops on specific topics related to mentorship, well-being, or career and professional development for graduate students and postdoctoral scholars, which will be submitted separately for institutional approval.

Interpretation of the Statement of Task

The Statement of Task provides us with an initial guide and starting point to help focus our work and explorations. As noted, we will build from this statement, working within our interpretation to identify innovation and inform discourse on the selected topics.

While increasingly there is no “common” or “traditional” career trajectory for individuals in academic STEMM, a developmental or training trajectory does generally include movement from dependence on senior researchers, lab heads, and more experienced trainees towards greater independence, ownership of career trajectory, and development of academic research skills and STEMM identity. This career trajectory moves from undergraduate research training, through graduate or medical school, postdoctoral work or residency, and finally, to increased independence as professionals. While we have been tasked primarily to focus on the critical and understudied relationships and supports that occur during graduate and medical school, medical residency, and postdoctoral position, we will also consider and seek to understand the roles and experiences of faculty and other members of the STEMM research ecosystem.

Box 2

STEMM Research Ecosystem

A well-functioning and effective STEMM research ecosystem requires involvement from all individuals and organizations within the ecosystem. Individuals should be encouraged and supported to develop mentorship relationships at all levels and take advantage of a wide range of supportive and developmental resources available to them in this ecosystem. Members of a STEMM research ecosystem include (but are not limited to):

- Faculty and research staff
- Postdoctoral scholars, graduate and medical students, undergraduate students, and other learners, students, and trainees
- University leadership, school deans, department chairs, institute directors, program directors (e.g., research, training, and graduate program directors, etc.)
- Practitioners in student affairs, wellness/counseling, and career counseling
- Research funders (e.g., foundations, federal agencies, companies)
- Professional associations and disciplinary societies
- Education researchers and evaluators, journals and other disseminators
- Community organizations, NGOs, government agencies, and/or firms (particularly relevant for students undertaking community-engaged and/or applied research)
- Alumni and employers (who play significant roles in career-related education, such as through internships, informational interviews, external mentoring, site visits)

As we consider the positionality of individuals in the ecosystem, we are aware of the extent to which identity can play a role in the quality of mentoring relationships, exposure to harms that impact wellbeing, and access to professional development. We are also mindful that identities do not exist in a vacuum or function independently from each other. Intersectionality reminds us that the confluence of a person's identities (both privileged and marginalized) uniquely exposes them to varying

degrees and different forms of benefit, harm or oppression. In addition, we determined that to appropriately address the well-being, professional development, and mentorship of graduate and medical students, residents, and postdoctoral scholars, we need to understand and address the well-being, professional development, and mentorship of faculty—particularly early career faculty and faculty from marginalized and historically excluded populations.

We also recognized a confluence of societal impacts that highlight the urgency for this Roundtable. These include the national and global protests centered on racial equity, anti-Black racism and social justice over the last three years, and the ongoing COVID-19 pandemic and the return to in-person interactions from remote work. Other relevant matters include the academic labor movement gaining strength, the many studies on mental health issues in academia, the SCOTUS decision impacting admissions and hiring and advocacy towards creating a more equitable workforce across career stages.

We will, therefore, (1) expand the National Academies' previous work, (2) integrate concepts that have previously been addressed in isolation, and (3) address the current and anticipated future needs of students and faculty in STEMM based on societal shifts.

Working from both theoretical and practitioner-based perspectives, we will explore ongoing improvements and innovations and seek out examples of effective mentorship, well-being, and professional development practices and programs.

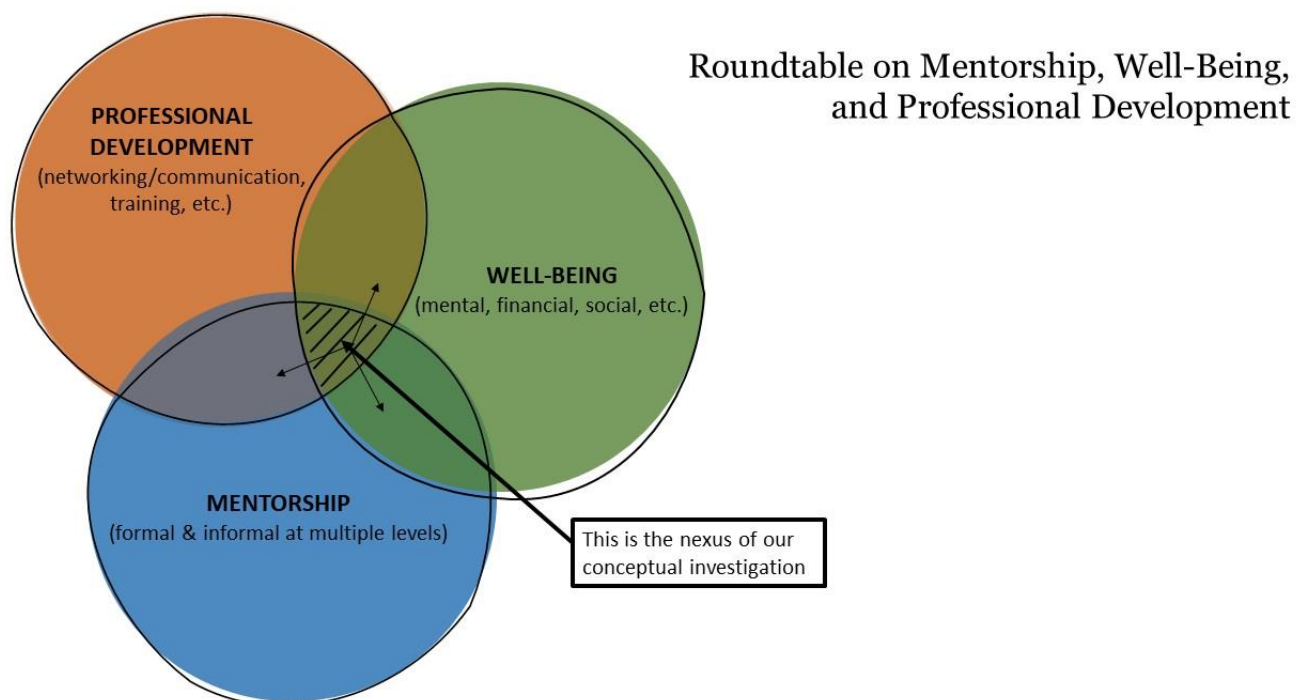
We recognize that effective practices and strategies may not relate directly to mentorship or other supportive practices, as phrased in our Statement of Task, and will use our collective knowledge and experience¹ to explore and address urgent and critical topics facing graduate students, medical students, medical residents and postdoctoral scholars, particularly for members of marginalized and historically excluded populations in STEMM.² Through workshops, commissioned papers, research, and broad communication and engagement, we aim to promote an inclusive and equitable higher education system and STEMM research ecosystem. We will focus on examining the interactions and interrelationships between identity, inclusion, personal agency, all forms of well-being (e.g., mental, financial, social, etc.),

¹ We come to this work as faculty mentors, academic leaders, graduate students, medical students, and postdoctoral scholars, applied and theoretical researchers of mentorship, well-being, and professional development, public and private funders, and professional societies' representatives.

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mentorship, and professional career development across the entire STEMM ecosystem (See Figure 1).

FIGURE 1: A Schematic of the Primary Focus Areas for the Roundtable



Goals and Approaches

We developed a set of guiding goals and approaches to achieve the five tasks laid out in the Roundtable’s Statement of Task (Box 1). We recognize that there may be translational gaps based on regional sociocultural contexts, including:

- **Focusing on the intersections and interactions between mentorship, well-being, and professional development** (see Figure 1), and exploring the topics with a holistic lens. Specifically, we will strive to examine the intersection and interplay of approaches and interventions (e.g., curricula, central services/programs, individual or small-group mentoring structures). We will also examine aspects of emotional intelligence, having an incremental belief system (e.g. growth mindset), addressing the hidden curriculum of the academy, and other related topics. This could include developing a framework or visual that communicates the relationship between these ideas.

- **Identifying beneficial practices with varying levels of supportive evidence**, including effective practices and policies that have evidence of success, ‘promising practices’ that have incomplete evidence and require more rigorous evaluation, and institutional structures and practices that support mentorship, well-being, and professional development, directly or indirectly. Specifically, we will try to highlight frameworks and structures that can be utilized by institutions to better implement holistic personal development of trainees (mentoring, sponsorship, professional development, and well-being) and provide means to measure their effectiveness. This could include creating toolkits or additional resources for varied forms of dissemination. We will also identify and contextualize historically unsuccessful approaches and possible pitfalls in implementation.
- **Catalyzing the creation of a national research-practice learning network** to exchange ideas, conceive and implement new strategies, and evaluate outcomes. This could include:
 - Bringing faculty (who mentor, teach, and govern within the research environment), practitioners and administrators (who develop and teach central programs, develop resources and serve as mentors), and mentees (who are the recipients and participants of programs and research environments in addition to potential future mentors who will replicate these practices) together to consider challenges in each domain and also explore ways to further synergies across topics
 - Building repositories of existing scholarship and resources that explore the intersections and interactions of mentorship, well-being, and professional development

This learning network could work to critically assess the evidence related to a wide variety of practices; identify the most important gaps for future research and evaluation; translate research to inform practice; and identify concepts, policies, and practices that can be translated across sectors (e.g., industry).

- **Creating a resource, such as an online guide**, to both highlight existing ecosystems for mentorship and work on integrating well-being and professional development. This guide will need to be maintained and may evolve according to shifts in the national conversation. This resource would also help identify levels of difficulty in implementation based on institutions' respective needs. Potential candidates to explore may include:
 - Mentorship-focused programs - CIMER, NRMN, MentorNet, etc.

- Postdoctoral research-focused programs - NPA, HHMI, Schmidt Science Fellows, MOSAIC, BWF, etc.
 - Doctoral scholars programs - SREB, GEM, BWF, Sloan, AGEP, McKnight, etc.
 - Scholars programs - McNair, HHMI, NIH-MARC, Cotrell, etc.
 - Training grant-funded programs - IMSD, NRT, T32, IRACDA, etc.
 - Affinity organizations - AMSA, NSBE, SHPE, SWE, NOBCCHE, AWIS, SACNAS, ABRCMS, EE Just, Bouchet, Understanding Interventions, etc.
 - Dissemination mechanisms for interventions - Professional Development Hub, NIH OITE, CIMER, Journals, Understanding Interventions, etc.
- **Investigating how systemic changes can be implemented across the STEMM developmental ecosystem**, including at the individual, department (academic) or group/team (workforce), institutional (academic) or company (workforce), state, and national levels. We recognize that while these systemic issues can transcend the United States scope, we will primarily be working through a US lens. In addition, we will use systems theory and other relevant social change theories and approaches to identify current beliefs around mentorship, well-being, professional development, and identity in STEMM culture and defining actions to catalyze change. This will include exploring and highlighting current systemic changes and issues or challenges that may necessitate systemic change (e.g., [the strike of post-docs and researchers in the UC System](#)), defining incentives, convening appropriate groups of people together to lead toward incentives being piloted, and analyzing current barriers to change.
 - Conducting a gap analysis of what is needed in mentorship, well-being, and professional development in STEMM, as well as exploring interactions and intersections of these and other relevant topics. Using this analysis, the Roundtable could leverage results to decide how to design their workshops and identify future areas of exploration.

Concepts and Definitions

To help shepherd our work together, we have developed a set of shared definitions and concepts that we expect to use often.

MENTORSHIP

Mentorship is a professional, working alliance in which individuals work together over time to support the personal and professional growth, development, and success of

the mentee through the provision of career and psychosocial support. Ideally, these alliances are also responsive to the needs, goals and interests of all members of the relationship.³

Mentor

An individual in a mentoring relationship who is providing career and psychosocial support. Commonly, in academic STEMM, this role is served by a faculty member or other researcher, but mentors may also be peers, staff, administrators, or individuals outside of the academic ecosystem (e.g. consultants) playing these support roles. We also recognize that “mentors” in academic STEMM—individuals who are referred to as mentors but may or may not provide career and psychosocial support—often simultaneously perform additional roles, such as advisor, supervisor, sponsor, advocate, principal investigator, and collaborator, and these different roles may add different layers while interacting with their mentees.

Mentee

An individual in a mentoring relationship who is receiving career and psychosocial support.

Inclusive Mentorship

Culturally responsive mentoring is aimed at the development and empowerment of individuals and facilitates their intellectual growth and career discernment while affirming their social and cultural identities.

- Personalized, responsive mentoring relationships should evolve and grow over time, mirroring the needs of mentees as they shift to career-stage-appropriate independence and develop their own mentoring styles.
- Ideally, these relationships result in a mentee developing a strong identity as a disciplinary professional, a strong sense of self and personal identity, and the knowledge and skills leading to increased confidence and ability to successfully negotiate the culture of a chosen field or profession within or beyond academia.

³ This definition of mentorship was adapted from the NASEM consensus study on the [Science of Mentorship in STEMM](#)

Mentoring Networks

Individuals may benefit from having a network of mentors, not only to take advantage of varying experience and expertise, but to also benefit from divergent perspectives.⁴ This network typically evolves as individuals encounter changing issues and questions. Mentoring networks can facilitate exposure to scholars engaged in research and collaborations on projects that are in sync with their research interests.⁵

Mentorship Education

Mentors and mentees can learn evidence-based mentoring practices (e.g., the [Entering Mentoring curriculum](#) disseminated through the University of Wisconsin's [Center for the Improvement of Mentored Experiences in Research](#)) and how successful mentoring relationships can be created, cultivated, and nurtured. They can be supported by mentorship education and professional development that supports mechanisms for feedback, improvement, and accountability. Institutions with strong mentoring cultures take mentorship training seriously; they also recognize that scholars have differing mentoring styles, and that mentees vary in mentoring preferences.

Research indicates disparate access to culturally aware, high-quality mentorship for individuals from historically underrepresented identities in doctoral education. As such, a key goal for graduate and postdoctoral programs is to foster thoughtful matching of mentors and mentees to optimize mentorship relationships.

WELL-BEING

According to the NASEM Consensus Study Report on Mental Health, Substance Use, and Wellbeing in Higher Education, well-being is “a holistic concept referring to both physical and mental health.” It includes a sense of personal safety and security, emotional support and connection between individuals and within communities of support, mechanisms to cope with stressors, and access to services when appropriate for short- and long-term care. Well-being is multidimensional and can include mental, financial, and social components. It operates at an individual level, as well as at an environmental and ecological level. Promoting well-being and incorporating it

⁴ Chandler, D. E., & Kram, K. E. (2005). Applying an adult development perspective to developmental networks. *Career Development International*, 10(6/7), 548-566.

⁵ Higgins, M. C., & Kram, K. E. (2001). Reconceptualizing mentoring at work: A developmental network perspective. *Academy of management review*, 26(2), 264-288.

as a core value in the academy may help to encourage individuals to pursue an academic career; thus benefitting the future of research and innovation in the US and beyond. We understand ‘wellness’ as an ongoing process and the practice of balancing competing interests in the pursuit of well-being.⁶

PROFESSIONAL DEVELOPMENT

Professional development refers to ongoing educational and career training opportunities that a person may engage in to assist in the development of transferable skills such as management, leadership, and communication; stay up-to-date on current trends; and advance their career.⁷ It is the attainment of new knowledge and expansion of existing skills that can be actively utilized in a professional environment pre-career (training as a student or postdoctoral scholar) and throughout all career levels (after entering the workforce). Professional development should occur throughout the career trajectory, beginning during one’s secondary (and even primary) level education.

Professional development benefits the individual being trained, as well as the workplaces in which they receive their education or are employed. Similar to mentorship, professional development can be both formal and informal. The knowledge, skills, and abilities that a person acquires can help to build their professional confidence and increase their engagement, satisfaction, and level of performance. Professional development can also help individuals to enhance and clarify their career path, career exploration, and/or preparation for career transitions.

As a result, institutions or organizations may be more likely to retain students/workers who increase efficiency and productivity through professional development activities. When professional development is directly tied to mentorship, mentors can also learn from their mentees by gaining new perspectives and methods that may improve their teaching and leadership skills. Through professional development, individuals may engage in a reflective process to think about how newly acquired knowledge and/or skills will positively impact their career advancement and well-being.

⁶ Myers, J.E., Sweeney, T.J. & Witmer, J.M. (2000). The wheel of wellness counseling for wellness: A holistic model for treatment planning. *Journal of Counseling and Development*, 78, 251-266. <https://doi.org/10.1002/j.1556-6676.2000.tb01906.x>

⁷ A cross-institutional analysis of the effects of broadening trainee professional development on research productivity <https://journals.plos.org/plosbiology/article?id=10.1371/journal.pbio.3000956>
Increasing faculty support, respect, and ability to help doctoral students explore non-academic research career opportunities <https://www.sciencedirect.com/science/article/pii/S2405844023002591>
Using stakeholder insights to enhance engagement in PhD professional development <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0262191>

MEMBERS OF THE ECOSYSTEM

We provide here, to the best of our ability, working definitions for different groups in the scientific ecosystem. Hierarchies and power dynamics exist between these groups that can both foster and promote change towards inclusivity or continue cultures of exclusion. Addressing these relationships is outside the scope of this framing document but will inform the work of the Roundtable.

Staff (as providing programmatic support to trainees)

Individuals who assist with administrative management, resource guidance, and support services to trainees.

Staff (in the research group)

Individuals who provide support, coordinate, and/or contribute to research under the supervision of the Principal Investigator.

Deans, Chairs, and Leadership

Individuals who set and maintain institutional policy, practice, and culture. While members of the community are largely appointed to these roles and are expected to spend the majority on their time on academic administration, we acknowledge informal leaders who have significant power and influence on how work is done and decisions are made.

Graduate Students

For the purposes of the Roundtable, a graduate student is a person who is enrolled in a graduate degree program.

Postdoctoral Scholars or Fellows

According to the National Science Foundation National Center for Science and Engineering Statistics, a Postdoctoral scholar (postdoc) meets “both of the following qualifications: (1) holds a recent doctoral degree, generally awarded within the past 5–7 years, such as PhD or equivalent (e.g., ScD, DEng), or first-professional degree in a medical or related field (e.g., MD, DDS, DO, DVM), or foreign degree equivalent to a U.S. doctoral degree; and (2) has a limited-term appointment, generally no more than

5–7 years, primarily for training in research or scholarship, and working under the supervision of a senior scholar in a unit affiliated with the institution.”⁸

We note here that while these definitions of the postdoc are in practice, the role and title of the postdoc varies significantly among field, department, and even within institutions and departments. The lack of uniformity and standard practices on postdoc titles, roles, and sources of funding (research grants vs. training fellowships) has a significant impact of salaries (cite FoR’s work), access to benefits, professional development programming, and access to mentors.

Medical Students

For the purposes of the Roundtable, a medical student is a person who is “enrolled in any academic program and pursuing an MD degree (or MD-combined degree, such as MD-PhD) at a U.S. MD-granting medical school.”⁹

Medical Residents

“A medical resident is a medical school graduate with a Doctor of Medicine (MD) degree who is taking part in a post-graduate training program accredited by the Accreditation Council for Graduate Medical Education (ACGME). Medical residents work at doctors’ offices or hospitals to continue their education and medical training in a specialized field.”¹⁰

Early Career Researchers (ECRs)

The term “Early Career Researcher” is highly variable and depends greatly on field and often funding organization. It is commonly used as a criterion to differentiate between established researchers (who it is expected have networks, research portfolios, and some current funding) and individuals who are working to establish themselves in a field. Generally, a metric such as time from terminal degree (e.g., Ph.D., M.D., J.D.) is used; this time frame can vary from 4 to 10 years.

⁸ Survey of Graduate Students and Postdoctorates in Science and Engineering: Fall 2021
<https://nces.nsf.gov/pubs/nsf23312>

⁹ <https://www.aamc.org/data-reports/students-residents/data/facts-glossary>

¹⁰ <https://www.mua.edu/resources/blog/what-is-a-medical-resident-and-how-long-is-the-residency>

Trainees

Trainee is a broad term that is often used as a collective “catch-all” for individuals in a developmental stage of their career. This can include graduate and medical students, medical residents, and postdoctoral scholars or fellows as well as baccalaureate and post-baccalaureate students and apprentices. While many will reasonably object to the notion that a senior postdoc is still in “training,” the word is in common usage as a catch-all and we will use it here for that purpose, while recognizing its imperfections.

Advisor

A formal role described in University policy (each university may have its own description of the responsibilities of the advisor). Advisors provide general academic advice about adherence to rules and/or standards that apply for all students in a particular program.

Faculty Supervisor or Boss

A faculty member who oversees a student, postdoc or staff member’s effort as it relates to paid work as a research assistant, teaching assistant, postdoctoral scholar, or other paid or assigned role. The supervisor defines and directs the work, ensures that the individual is equipped to carry out their duties, and ensures that the work is performed. A supervisor does not, necessarily, serve in a mentoring role.

Sponsor

A person who uses their power, influence, or access to networks on another individual’s behalf.

Principal Investigator (PI)

The primary individual in charge of a particular line of research funding or portfolio of work. Often, these individuals are faculty members who are directly overseeing the research being conducted by a trainee or other member of a research team, including formal responsibility for the quality of the data, record-keeping, reproducibility, finances, ethical conduct, safety, publication, etc.

Faculty: One Person - Many Roles

The roles described above may often be held by a single individual in relation to every trainee or member of their research team. For example, most mentors are also advisors but not all advisors are mentors. Similarly, many mentors also hold the role of sponsors. Many advisors are also supervisors and, especially in STEMM, PIs. At times, the role of PI and mentor can come into direct conflict or may be unclear; in the worst cases, these tensions may lead to serious challenges experienced by trainees. For example, supporting a trainee's professional development or well-being may require that a student in a bench science program take time away from the lab, which may not serve the training program or faculty member's goals for research progress.

Throughout the deliberations and writings of this Roundtable, we will strive to use accurate language when referring to specific roles. We will be especially careful to only use the term "mentor" when referring to someone engaged in the act of mentorship as defined here. However, when a faculty member simultaneously performs multiple roles, we have decided to use "supervisor" in a similar fashion to how we will use "trainee" -- while recognizing its imperfections. Referring to a student's PhD Supervisor or Postdoctoral Supervisor is in common usage and avoids many of the pitfalls inherent in defaulting to "mentor," "advisor," or even "PI" when not discussing a specific relational role.

Discussion of Other Key Concepts

ASSESSMENT AND EVALUATION

Assessment and evaluation of mentorship are necessary to identify areas of strength and opportunities for improvement. Assessment processes allow for systematic reviews of individual and unit level activities, focused on continuous quality improvement. Evaluation processes allow for the use of established metrics to document and make evidence-based observations about individual or unit-level performance for the purpose of making decisions on the provision of valued outcomes (e.g., merit raises). Evaluation through structured systems may reduce unintentional bias and protect mentees who are in inherently more vulnerable positions as students and trainees ([Recommendation #3, NASEM Consensus Study](#))

ACCOUNTABILITY

Accountability is the process of adopting mechanisms ensuring that policies, practices and expectations are effectively implemented and/or that desired performance results are achieved. In effective mentoring relationships, it includes acknowledgement and

understanding that accountability is bidirectional between mentors and mentees to establish and maintain a quality mentorship relationship. Implementing effective accountability mechanisms requires taking into account the power differentials that exist between students and faculty, especially given a student's dependence on mentors for factors related to career advancement (e.g., letters of recommendation and networking support).

INCENTIVIZING MENTORSHIP

Positive incentives for excellent mentoring may include benefits, inducements or recognitions that acknowledge faculty and others in mentorship roles who excel as mentors. Incentives typically aim to inspire changes in practices by individual faculty or academic units that may face challenges. Such incentives may include efforts designed to recognize the time, effort and effectiveness demonstrated by mentors, or changes in structures and policies tied to professional advancement. Often, this investment of effort in mentorship may be perceived to be at the expense of other areas, including research productivity. The modern university tilts consistently in the direction of rewarding research productivity, so deliberate incentives (i.e., time, money, recognition) may be required to encourage effective mentorship practices.