Mali, F., Kronegger, L., Doreian, P., & Ferligoj, A. (2012). Dynamic scientific co-authorship networks. In Models of Science Dynamics: Encounters Between Complexity and Information Sciences (pp. 195-232). Springer. <https://doi.org/10.1007/978-3-642-23068-4_6>

In this seminal book chapter, Mali et al. (2012) offer a nuanced examination of the structural dynamics within scientific co-authorship networks. They outline the multifaceted nature of scientific collaboration, extending beyond co-authorship to include activities such as shared editorships, supervision of projects, research proposal writing, program participation, and conference organization. This broad view acknowledges that a substantial portion of scientific collaboration remains uncharted in formal publications, a consideration crucial for comprehensive network analyses in contemporary science studies.

The authors highlight key methodological advances in social network analysis (SNA) that have reshaped our understanding of these complex networks. The development of exponential random graph models (ERGMs) for dynamic network study, the incursion of physicists into the SNA realm, and the subsequent introduction of new modeling strategies have been pivotal. The chapter details the influence of small-world networks and preferential attachment concepts, illustrating their implications for the formation of scientific collaboration networks.

A particular focus of Mali et al. (2012) is the intersection of social, disciplinary, sectoral, and geographical elements within the scientific community, which together construct a modular structure of collaboration. They emphasize that science is not a monolithic entity but a collection of overlapping and interacting networks. The work underscores the importance of interdisciplinary work, highlighting its rise and the challenges associated with its measurement and operationalization. Mali et al. note the varying organizational and cognitive obstacles to interdisciplinary research, including the need for extensive networks, significant time investment, and researcher mobility across disciplines.

The discussion on network topology provides valuable insights into the clustering and fragmentation indicative of disciplinary boundaries and the implications of mentorship and cumulative advantage in the network's degree distribution. The chapter further elaborates on small-world and scale-free network structures, revealing how these patterns reflect the underlying processes of collaboration and reward distribution within scientific communities.

Mali et al. (2012) also examine the roles of "gatekeepers" and "invisible colleges" in the distribution of resources and idea dissemination, highlighting the informal yet influential networks that often dictate the course of scientific research. The work serves as a critical resource for understanding the dynamics of co-authorship networks and the forces that drive the evolution of scientific collaboration.

For our study, the chapter's comprehensive review provides a methodological and theoretical framework for examining interdisciplinary collaborations within Boise State University. It informs our approach to operationalize interdisciplinary activities, assesses the distribution of mentorship and collaborative influence, and evaluates the cohesiveness of our research teams in response to the Grand Challenges initiative. By leveraging the concepts and models discussed by Mali et al., we aim to map the intricate web of collaborations at our institution and identify strategies to foster a fertile environment for interdisciplinary scientific discovery.