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The Global Scientific Workforce (GTEC) Framework^{1 2}

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This paper briefly outlines a novel framework for the study of the global scientific workforce to encourage refined analysis of the phenomenon and urge new data collection to improve what inquiry is possible. The current perception of the dynamics of the global scientific workforce is plagued with significant conceptual and empirical gaps. In most large-scale surveys of higher education, the global workforce is typically measured from a national perspective with a single dichotomous variable based upon either nation of birth, education, or citizenship status. As such, research on the globalization of the scientific workforce lags behind a rapidly changing reality.

The exceptional growth of knowledge flows across countries experienced in recent decades reveals profound changes on the scientific landscape (Wagner & Leydesdorff, 2005). Not long ago, it was possible to characterize international experience among faculty as exceptional – a small percentage of students spent a year abroad, and postdocs and junior faculty were discouraged from seeking positions in other countries. Select senior faculty competed for specific awards to study abroad once or twice in their careers, and, with few exceptions, the general expectation was that universities would continue to attract and retain their own national talent. However, the scientific workforce has at all career stages become more globally mobile (Ackers, 2005; Moed, Aisati, & Plume, 2013), doctoral curricula and expectations are converging across a broad set of countries (Rumbley & de Wit, 2017), competition for international scientific talent is increasing (Altbach, 2007; Foote, Li, Monk, & Theobald, 2008; Hazelkorn, 2014), and multinational collaboration teams are common (Gazni, Sugimoto, & Didegah, 2012; Wagner & Leydesdorff, 2005). Furthermore, the

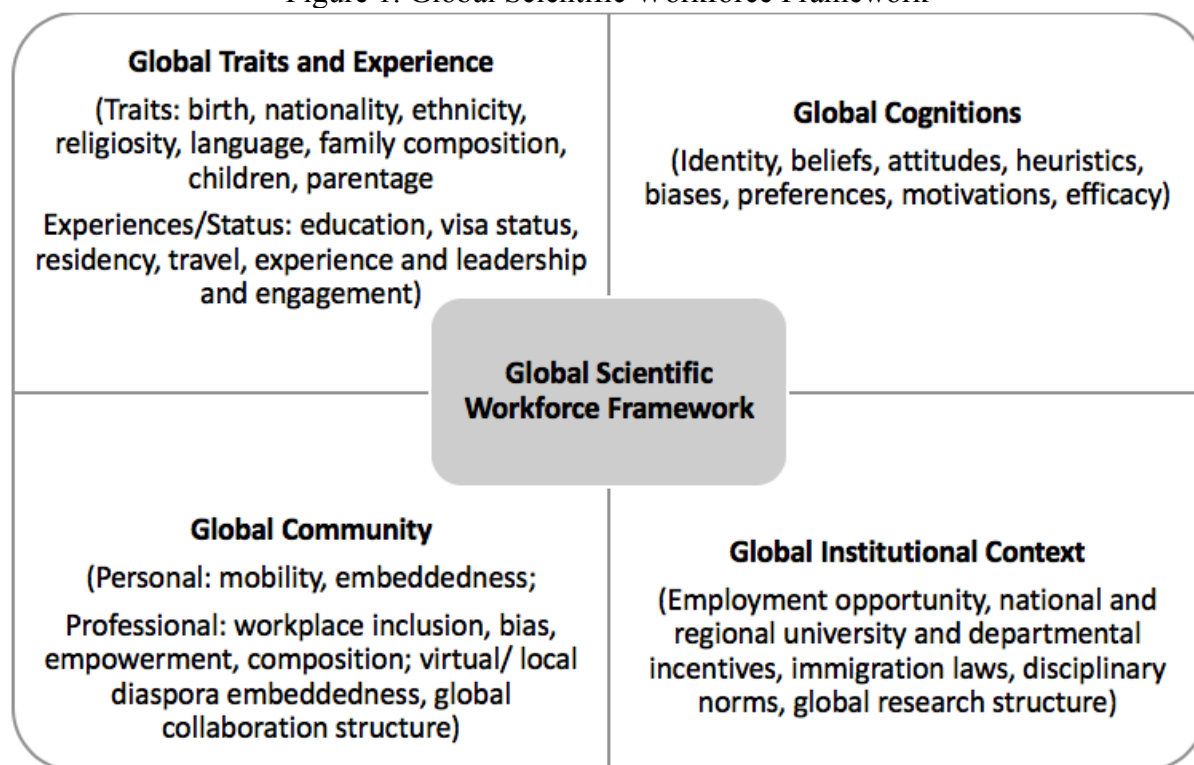
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² This is a summary of a working paper: "Framing a Long-term Research Agenda on the Globalization of the Scientific Workforce". Please contact the authors prior to quoting or citing to request an updated and full version of the paper.

population of scientists without borders is growing at an accelerating rate (Sugimoto et al., 2017).

Rather than considering the foreign status of an individual based on one or two dichotomous indicators, this paper recognizes that “foreign-ness” is a multidimensional concept (Mamiseishvili, 2011), closely linked to the notion of “globalness” and more complex than birthplace origin. To that end, we have developed a theoretical framework to characterize the globalized scientific workforce. In this paper, we briefly delineate the four dimensions that form the basis of the Global Scientific Workforce (GTEC) Framework, depicted in Figure 1.

Figure 1. Global Scientific Workforce Framework



These dimensions exist at two levels. In the top two sections of the framework, we focus on issues inherent in the individual and their personal experience.

Global traits and experience incorporates the personal traits that are inherent in a person's makeup, while their experiences refer to those activities or status that reflect different global activities and opportunities. We include measures such as birthplace and nationality or visa status that have been traditionally used to characterize foreign origin, but also recognize multiple components that capture additional features of the global scientist. We incorporate additional individual characteristics that potentially reflect nuances of foreign and/or global factors that affect a scientist's career, including race/ethnicity, sex, religiosity, language, parentage and other cultural characteristics of the individuals, groups or countries. Similarly, the experience dimension goes beyond the existing standard distinction based on whether a degree was earned in a foreign country to include the extent and level of international education, work experience, science leadership, and commercial engagement. Thus, traits and experience considers who are members of the global workforce, where they come from, and more broadly, their socio-cultural heritage.

Global cognitions are even more personal, and reflect the psychological perspectives, identity, confidence, and preferences of individuals. Cognitions further describe the ways in which scientists perceive, interpret, and internalize the global context by accounting for their expectations, attitudes, beliefs, and preferences relevant to their career and personal life.

The lower half of the framework focuses on the social and institutional contexts in which individuals live, work, and interact. The community dimension allows framing the global scientific workforce beyond the individual, recognizing the integration of the individual in the social context. This dimension recognizes community as a referent, as a social milieu, and as a source of resources, incorporating both the personal/family community as well as the professional. As such, communities may be physically proximate, entirely virtual, or a combination of the two.

Finally, the institutional context recognizes differences in the globalization of science across countries and fields/disciplines. Context reflects the governance and structural aspects of research communities, legal structures and institutional characteristics that affect work, mobility, and advancement relevant to an international scientist. These aspects recognize that institutional context may act to widen or restrict the opportunity environment for global collaboration and employment for many individuals.

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