

4/4/19

### **Responses to Questions for the Record**

Dr. Joan Ferrini-Mundy, President, University of Maine

Hearing: *Inclusion in Tech: How Diversity Benefits All Americans*

US House of Representatives Subcommittee on Consumer Protection and Commerce for the Committee on Energy and Commerce

From the Honorable Robert E. Latta:

1. Dr. Ferrini-Mundy, I want to draw specific attention to your testimony where you speak about diversity powering the changing STEM workplace and how important diversity and inclusiveness are to solving complex problems.

I recently heard from one of my constituents, Lynn Child, who is the President of CentraComm, an IT security and infrastructure provider in Findlay, Ohio. Drawing from her personal experiences running CentraComm, she indicated that it could be difficult to address emerging cyber threats to businesses and personal data if private companies and public sector officials are unable to explore diverse viewpoints. It is important to avoid groupthink and hire a workforce that can draw on their unique experiences to address problems.

- a. Dr. Ferrini-Mundy, can you talk more about how diversity in the STEM workplace can avoid this problem of groupthink so that we can address the most pressing issues facing our country?

Researchers in fields including business, economics, political science, social psychology, and education are studying the impact of various forms of diversity on different components of idea generation, problem solving effectiveness, and even profitability. Some of this research is summarized in my written testimony<sup>1</sup>: “Research indicates that when solutions are derived by diverse teams those solutions are more feasible and effective, and often more profitable. For instance, Cumming and Leung (2018) have studied the role of diversity on corporate boards. They summarize literature on this as providing evidence that diversity in race and expertise “positively affect innovation,” and that diversity in experience and gender affect innovation. Hong and Page (2004) use mathematical modeling to demonstrate that “when selecting a problem-solving team from a diverse population of intelligent agents, a team of randomly selected agents outperforms a team comprised of the best-performing agents.” (pg. 16387) Page has made strong claims about the important role of diversity in problem solving, stating that “People from different backgrounds have varying ways of looking at problems

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<sup>1</sup> Ferrini-Mundy, J. (March 2019). The critical role of higher education in preparing a diverse science, technology, and engineering workforce for tomorrow. Testimony at the hearing *Inclusion in Tech: How Diversity Benefits All Americans*, before the Subcommittee on Consumer Protection and Commerce of the Committee on Energy and Commerce, U.S. House of Representatives, representing the University of Maine.

... there's certainly a lot of evidence that people's identity groups – ethnic, racial, sexual, age – matter when it comes to diversity in thinking.” (Dreifus, 2008).”

Research by Harvey<sup>2</sup> examines in more detail the particular parts of problem solving and idea generation and the impact of various types of diversity on those aspects. In her literature review she claims: “Where ethnic or cultural diversity are relevant dimensions for a task, they have also enabled groups to produce a set of higher quality ideas (McLeod et al., 1996) and identify more problems and perspectives (Watson et al., 1993)” (p. 4). Her results are nuanced but she concludes “...the benefits of diversity are most likely to be realized when the entire creative output of the group can be considered, and when building on and combining ideas are less important.” That is, in generating many new ideas, which can be seen as the opposite of the more limiting and convergent groupthink (which can be useful for implementation and execution), diversity makes a difference.

In a project recently at my university, in a group comprising mostly research scientists, a professor of finance was able to get the group “unstuck” from a line of thinking they were pursuing by deftly interjecting knowledge and an example from his background. This was an example of a benefit of diversity in experience and knowledge.

From the Honorable Richard Hudson:

1. Dr. Ferrini-Mundy, in your testimony you referenced the National Science Foundation's research on “The Future of Work at the Human Technology Frontier”. As technology continues to advance it is critical for our workforce to keep pace and evolve alongside technology. The NSF acknowledges the risk we run if the demand for skills is not met by current educational pathways. You cite the need for employers and universities to engage in joint planning to increase diversity in a way that will be mutually beneficial for both parties.
  - a. In your experience, how have you been able to develop these relationships with employers to increase diversity and give students real world opportunities in STEM fields?

Some of the most interesting work related to diversity of which I am aware is based on the notion of collective impact<sup>3</sup> and the associated concepts of networks and backbones, and implemented within the National Science Foundation's INCLUDES program<sup>4</sup>. There is evidence to suggest that when teams collaborate under a set of key conditions the prospects for change are significant: “...substantially greater progress could be made in alleviating many of our most serious and complex social problems if nonprofits, governments, businesses and the public were brought together around a common agenda to create collective impact.”<sup>5</sup> This notion of bringing together groups from different sectors to collaborate with

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<sup>2</sup> Harvey, S. (2013). A different perspective: The multiple effects of deep level diversity on group creativity. *Journal of Experimental Social Psychology*. 49(5), pp. 822-832.

<sup>3</sup> Kania & Kramer, 2011. [https://ssir.org/articles/entry/collective\\_impact#](https://ssir.org/articles/entry/collective_impact#)

<sup>4</sup> [https://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=505289](https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=505289)

<sup>5</sup> Kania & Kramer, 2011. [https://ssir.org/articles/entry/collective\\_impact#](https://ssir.org/articles/entry/collective_impact#), p. 4.

a specific goal in mind and with key milestones has, in my experience, been an effective approach through which higher education and employers can engage to provide students with real-world experiences and also ensure different kinds of diversity, and where there is designed mutual benefit.

At the University of Maine there is a very good example in our Pulp and Paper Foundation, an organization incorporated in 1952 by 12 UMaine graduates with the goal of financially supporting and preparing well-educated engineering students for careers in the pulp and paper and allied industries.<sup>6</sup> This foundation is supported by annual gifts from more than 70 companies in 50 states, as well as individual gifts from more than 250 alumni and friends. The Pulp & Paper Foundation currently supports up to 90 engineering and forestry students with merit-based scholarships. In this case the pulp and paper industry corporate leaders from across the nation have as a goal to supply their industry with the next generation of creative problem solvers from a range of fields and diverse backgrounds, and the university's goal is to help students find meaningful experiences and learning opportunities in an areas of great importance to the state of Maine and beyond. This kind of mutualism is key to having desired impact.

b. What have you learned from these engagements that other institutions could take advantage of?

I have learned that being clear about common and shared goals with partners, being explicit about the ways in which diversity is likely to benefit progress toward those goals, and determining agreed-upon benchmarks and outcomes of the partnership, are essential.

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<sup>6</sup> <https://mainepulpaper.org>