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2020 Young Member Summit Scholarship

What is the greatest challenge facing structural engineers and/or the structural engineering profession in the next five years? Please identify how your local SEA and/or NCSEA can address this issue.

The "Vision for the Future of Structural Engineering" jointly released by CASE, NCSEA, and SEI in 2019 provides compelling direction for our profession. This type of collaboration within and beyond structural engineering is essential for assuming greater leadership within the construction industry. In this paper, I will focus on three critical areas highlighted in the joint statement: sustainable design, education reform, and addressing inequality within our profession. Coordinating the ingenuity and energy of structural engineers to address these three challenges is the greatest challenge facing our profession in the next five years.

Structural engineers can promote sustainable design by assuming greater leadership in the design process. Embracing collaboration through Design Build and Integrated Project Delivery could enable structural engineers to promote solutions such as life cycle assessments of embodied carbon, materials made from waste and replenishable sources, enhanced reuse of existing structures through performance based design, and designs with optimal structural forms. In a 2015 paper titled "Structural Innovation: Combining Classic Theories with New Technologies" the authors discuss how one structural form can be inherently more efficient than another by assessing a variety of trusses. Their analysis combined insights from classical load path theories from the 19th and 20th centuries with current topological optimization methods to determine the most efficient truss form. The results showed that trusses with less material could deflect less by optimizing the load path. Steering designs toward intrinsically efficient geometries from the start is one way for structural engineers to promote sustainable design. This approach of broadening the field of structural inquiry should be embraced since implementing the heightened level of collaboration between architects, construction managers, and structural engineers will require a more holistic view of our role.

Forming young structural engineers with a holistic understanding of the built environment can be expedited by increasing interactions with architects and construction managers as a part of the undergraduate curriculum. This cross-pollination can be implemented through requiring interdisciplinary classes and multidisciplinary design competitions. Embedding this in the curriculum would initiate relationships and understanding of the challenges faced by other members of the project team that would catalyze coordination on not only project delivery, but also on broader challenges facing the industry. My own participation in the Associated Schools of Construction (ASC) Design Build Competition enriched my undergraduate education by exposing me to the challenges faced by the construction management team as well as by the architect. Young Member Forums that enable

continued interaction across disciplines for young professionals should be encouraged as a continuation of educating engineers.

To attract the best and brightest to our profession, structural engineers must show that we are committed to a workplace that enables success for anyone who is willing to work hard. A first step towards this goal of an accessible profession is to understand where we currently are - to “Know Thyself”. This self-reflection has been facilitated by the 2016 and 2018 Survey Reports by the NCSEA SE3 Committee. While the lack of a gender pay gap aside from principals and sole proprietors found in the 2018 survey is a cause for relief, the surveys did highlight less quantifiable barriers to success in our profession for women such as inflexible work schedules and societal pressures for women to be primary caregivers. Another shortcoming of our profession is the non-representative proportion of minorities. Surveys should be completed by SE3 chapters or similar organizations to understand barriers to entry for minorities and determine best practices for promoting paths to success for them. These will likely include current initiatives such as mentorship programs and scholarships as well as more active efforts to identify and remove systemic barriers. The effort required by self-reflection and action to address barriers to success in the structural engineering profession will engage current practitioners, affirm our commitment to the welfare of society, and attract the best and brightest from all backgrounds.

Structural engineers enable the creation of the iconic skyscrapers that push our imagination to the infrastructure that facilitates our day-to-day lives. Our central role in finding ways to sustainably use materials to construct a resilient built environment in which a growing population can thrive places our profession face to face with myriad challenges. Leadership that inspires structural engineers to find ways to address these obstacles is the greatest challenge our profession faces in the next five years. Championing sustainable design by greater involvement in project delivery, reforming education to provide holistic understanding of the built environment and leveling the playing field to success will require coordinated effort that can only be achieved with national and interdisciplinary leadership.