Thompson described the form of an organism as the result of intrinsic and extrinsic forces — a plastic, responsive and evolutionary medium that is in continual interaction between genetic coding and environmental conditions. Orthogonal researchers: theorist, and surgeon: Harold Frost, observed that adaptive bone generation, known as remodeling, does not occur according to static loading, this process requires neural loading as the result of dynamic bio-mechanical forces. Following years of observed data from ongoing experimentation he described the process of remodeling in which force-induced mechanical signaling is the stimuli that triggers biological response. Thompson, looking through the lens of evolutionary biology, and Frost, looking at biomechanical forces at the cellular level, fused observation, instrumentation, and mathematical modeling to develop theories for basic systems that form the modern foundation for the next generation of performance-based methodologies for the built environment.

Seeking to engage the built environment in similar bio-mechanical transactions, the Emerging Materials Technologies (EMT) program views the intrinsic and extrinsic forces at play in materials and processes as fluid and dynamic, able to fluctuate freely with advancement in the imagination producing an alliance of physical and intellectual dexterity.

This pedagogical process and resultant work produced at the EMT program aimed to establish a dual protocol of precise observation and imaginative experimentation, where material becomes plastic in the laboratory, and thus available to the flow and stored play of invention, where a conservation of force as well as a conservation of materials is realized, obtaining a true economy of production — a transaction that is conceptual, ethical, unscripted and effective.

Juror Comments: This submission situates emergent materials analysis, testing, and building integration within the realm of creative design thinking. Within this context, faculty and students explore performance-based design as a sustainable vocabulary, not only as a formal ordering system that demonstrates applied materiality, but also, how those flows could ultimately become integrated practices with embedded material intelligence. The range of scales from simulation to fabrication is particularly noteworthy when viewed through the lens of creative innovation and invention.