

## CantoVario and the NSF TIP (Technology, Innovation, and Partnerships) Directorate

In Fall 2018, Cantovario participated in the MIT I-Corps node's SPARK Program, conducting 32 interviews with students (ages 12-22). Results revealed that 88% or more listen to music daily, access streaming services, share music, and experiment with music. Furthermore, they highly value music as part of daily life, and if given the chance to **directly interact with music**, they would. These interviews gave credence to an application for creating musical variations of songs, as well as a science museum exhibit prototype featuring **direct interaction with music** via variation, chaos theory, and the sound-focusing technology of CantoVario's Industry Partner—Brown Innovations.

CantoVario then submitted an application to the NSF Innovation Corps (I-Corps) National Teams Program and was awarded a 50K grant for customer discovery.

As the entrepreneurial lead for the CantoVario team, I completed 170 face-to-face interviews in 6½ weeks, May 6 – June 13, 2019. These interviews yielded context as well as gain/pain points, focusing mainly on musician-producers: aspiring, student, and professional.

The interviewees covet an artistic state of complete immersion in the current experience such that time ceases to exist. They highly value this gain point because their creativity flows effortlessly; they get “swept away.” But when not in that artistic state, i.e., when their creativity feels blocked, they experience pain. This pain—palpably expressed by voice and visual countenance during interviews—results in “stress, anxiety, and self-doubt.”

Though professionals can get stuck, they've developed strategies for moving past these pain points, having experienced numerous creative projects over many years. Yet the vast majority of aspiring musician-producers do not have their skills. However, they too have a job to be done, and that job is creating music, often under time constraints. CantoVario addresses the pain points of stress, anxiety, and self-doubt, by 1) reducing the barrier to enter—and stay in—an artistic state, 2) igniting ideas, thus diminishing stuck time, and 3) decreasing the time to go from idea to final result.



The Director of The Bridge, a Knight Foundation funded incubator for musician-producers in Miami, FL, offered The Bridge as an interview site for CantoVario's I-Corps interviews in Miami. A month later, she wrote: “CantoVario does for the musician, the very thing we all need when we're stuck. It simply nudges us a bit and gets the wheels turning again but in a new direction. It creates a change of perspective on a synaptic level. CantoVario doesn't distract us from our goal or scrap the whole thing for a fresh start. It takes what we've done and re-

packages it for us in a way that we might not have come up with on our own. This can be like a breath of fresh air for a stuck composer. Our very own idea looking right back at us but now with an interesting twist that we're free to take or leave. The value is not in what the program produces musically. The value is in freeing the creative process from this spiraling rut.”

In 2020, NSF awarded CantoVario a Partnerships for Innovation-Technology Transfer grant to catalyze research and development (250k). Three prototypes have evolved: a MIDI Variation Engine, a Mashup MP3 Variation Engine, and an Audio Variation Engine for varying individual songs. NSF also awarded CantoVario 3 summer REUs (Research Experiences for Undergraduates: 2023, 2024).