John Konsin and Prapela, Inc

Part A: Becoming a Healthcare Executive

John Konsin fell in love with the healthcare industry early in his career. After earning a master's degree in business administration, he joined 3M, a diversified products company. Best known for the iconic Post-it Notes, 3M also offered industrial products (e.g. adhesives), computer products (e.g. floppy disks), healthcare products (medical tapes, wound dressings, and surgical drapes), and many others. John served in the role of an internal marketing consultant through which he gained exposure to a broad variety of industries. In the process, he began noticing his growing interest in interacting with physicians and nurses, learning about medicine, and being in a position to positively influence health outcomes for many people.

From that launchpad at 3M John's career continued with a full focus on the healthcare industry. He steadily rose through the ranks in product management and marketing at well-known healthcare industry players such as Kimberly-Clark, Philips, and Medtronic. In the process, John gained in-depth exposure to venture development and mergers and acquisitions as his companies acquired others or were acquired themselves. Over time, John's career gained further focus on medical devices as he led the endoscopy division at a medical device startup and then led the sports surgery division at a medical device leader Medtronic.

A track record of this kind leads to the C-suite. John's case attests to that. He was asked to lead a medical device company, RS Medical, as a chief executive officer. The company developed and commercialized drug-free pain management devices. It had a particular focus on serving the military, particularly via the US Department of Veteran Affairs.

Over the course of his career, John grew in proximity to entrepreneurial developments in healthcare. He began advising startups and, upon conclusion of his service to RS Medical, John was asked to become a Startup Adviser at the Wyss Institute for Biologically Inspired Engineering. The Wyss is a Boston-based institute that, in a partnership with Harvard Medical School, develops innovative solutions for healthcare problems. It aspires to push scientific progress beyond the lab bench and into the market. One of the ways that it pursues that is by partnering experienced executives such John with researchers. It is at the Wyss that John learned about the technology that eventually became Prapela.

Questions for student discussion:

1. What qualities do you think enable someone to have a successful career in healthcare, a career that spans both established enterprises and new ventures?
2. What do you think are the differences between the factors that make healthcare executives and healthcare researchers successful? And what are the similarities?
3. How important do you think it is to have highly experienced leadership for a healthcare startup? And how do you think you could mitigate that if you currently don't have that?

Part B: The Stochastic Resonance Technology

Initially, John's work at the Wyss focused on a project exploring commercialization pathways for a new technology in the emerging field of the human microbiome. However, that didn't last and within John's first year at the institute that project wound down. Eventually, the institute asked John to evaluate a prototype based on a different technology and aimed for a different application.

The technology was based on the science of stochastic resonance (SR). The science is based on an observation that a signal that is too weak for detection by a sensor can be amplified through the addition of white noise. In general terms, the frequencies in the white noise in the original signal resonate with the white noise in the added signal, thereby increasing the output of the original signal without increasing the white noise. This observation resulted in a robust signal processing technique for increasing the signal-to-noise ratio of a given signal.

Stochastic resonance was first observed in the early 1980s by physicists studying the Earth's climate. Since then, the phenomenon has been observed and documented in a broad range of fields such as physics, chemistry, biology, neuroscience, and even finance. SR has also led to a broad array of actual and hypothesized applications. The technique has been demonstrated and applied in wireless communication systems, lasers, semiconductors, nonlinear optics, and solid state devices. It continues to play a role in emerging technologies; for example, today it sees utilization in image recognition and natural language processing.

In medicine, SR is utilized in electroencephalography (EEG) and magnetoencephalography (MEG) to measure brain activity. There are also medical devices that rely on stochastic resonance to amplify sensory and motor functions. For example, SR enables vibrating insoles that assist the elderly or patients with conditions such as diabetic neuropathy or stroke.

Among the researchers encountering and studying SR was Dr. David Paydarfar. In the 1990s, as part of research on squids at the Woods Hole Oceanographic Institution, Dr. Paydarfar made an observation that a squid's axon – an organ responsible for a squid's propulsion in the water – activated every time the squid was placed on a gently vibrating surface. Fascinated by the unexpected observation, Dr. Paydarfar approached a colleague, Dr. Jim Collins, who explained to him the phenomenon of stochastic resonance. In learning more, Dr. Paydarfar became enamored with this science and its possible applications.

In particular, Dr. Paydarfar happened to know that some babies suffer from irregular breathing. The human brain monitors internal and external signals and transmits signals that activate respiratory muscles. This cycle of signal input and output creates rhythmic breathing, a basic underlying pattern of human life. The brain of a newborn sometimes can struggle to detect some signals, which can lead to irregular breathing and create life risk. This is especially the case with babies born pre-term. So he began to wonder about the potential to harness SR in order to help babies breathe.

The problem of irregular breathing is a particularly acute one for opioid-exposed babies. After exposure to opioids during pregnancy, newborns can develop a neonatal opioid withdrawal syndrome. This life-threatening condition creates tremors, irritability, and breathing problems. On a national level, a newborn is diagnosed with this conduction every 15 minutes in the United States. On a hospital level, a hospital can be overwhelmed by inconsolable newborns. On all levels, and especially on the personal level, this is a tragic and unfortunate situation.

At first, Dr. Paydarfar developed and published a mathematical model demonstrating theoretically that SR could indeed be an effective approach for respiratory improvement in newborns. But that was just the beginning. Over the next fifteen years Dr. Paydarfar conducted a series of experiments, resulting in peer-reviewed studies, that proved the theoretical conjecture experimentally.

As part of this long and persistent journey Dr. Paydarfar served on the faculty at the Wyss. While there he partnered with Jim Niemi, a biomedical engineer at the Wyss. Together they developed the first version of a SR-powered neonatal mattress. This "Wyss bassinet" was equipped with a stochastic resonance stimulator. The stimulator emits unique random signals through vibration that activate the brain's pacemaker neurons. These neurons are responsible for breathing and heart rate and their stimulation improves the breathing rhythm.

The studies done utilizing the experimental bassinets provided the initial indicative evidence that these bassinets did improve the respiration rates in opioid-afflicted newborns. The Wyss presented the evidence to John. He studied it for several weeks, came back to the Wyss team and said: "Would you let me take it to market?"

Questions for student discussion:

1. Imagine that you are John Konsin and you are intrigued. What questions would you ask Dr. David Paydarfar and Jim Niemi about the stochastic resonance technology and its expression in the form of a neonatal bassinet? In essence, what knowledge would you need about the underlying science and how would you evaluate the pros and cons of the technology?
2. What are the pros and cons of commercializing a proven and widely used technology?
3. What would compel you to dedicate yourself to this project?
4. What important steps would you undertake to begin commercializing the SR-powered bassinet?
5. What main challenges do you foresee on John's journey?