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## Unified Diversity: The Team Game

### Chapter I

“I wish we had information about bed availabilities and emergency procedures before referring the patients”, I told my classmate during a posting at the emergency room in medical school as we asked a patient to be taken to another hospital for emergency coronary stenting. “Why don’t we have it?”, he responded, which triggered a series of questions between us, mostly ‘Whys’ and ‘Hows’. Referrals are blind without knowing if the other institutions have availability and the necessary settings for performing life-saving procedures since there is no real-time information. This problem is rampant in India mainly due to overburdened healthcare facilities. As five final-year medical school students brainstormed over potential solutions, we realized that although we might be able to propose them, we don’t have the technical skills to execute. We contacted our friends in engineering schools pursuing their degrees in computer science, detailed out the problem statement, and took their opinions on feasibility of the solutions. After weeks of intense discussion, and going back and forth, we came up with a mobile application named ‘AppEase’ which connects with the phone’s GPS navigation to show live availabilities of beds and emergency procedures in the nearby healthcare facilities. Months later, as we included friends studying business management in the team, we presented the working prototype at a symposium and found many physicians and organizations ready to invest and adopt the technology. Although we didn’t proceed further with the idea once we graduated, the seed of excitement of working in a multifaceted team and entrepreneurial thinking got sown deep inside me.

### Chapter II

“I really don’t like the needle pricks, I get scared”, my mom told me as I reminded her before leaving for my residency posting to get the routine blood glucose testing for HbA1c done. “Can we have an alternative way?”, I asked myself. Thinking of non-invasive methods, the first thing that struck my mind was pulse oximeter. Since it assesses the oxygen saturation in blood, while through HbA1c testing we intend to find the glucose saturation level in the form of glycosylated haemoglobin percentage, I thought, “Why not use a similar device for HbA1c testing as well?” After discussing with a few consultants of internal medicine and researchers in biochemistry, besides looking up for the principles on which pulse oximeter functions, I realized that this idea might well have the potential to be translated into something really useful. I collaborated with the divisions of internal medicine and biochemistry to put together a research proposal for submission to the institutional review board and funding. As the project involved translating data into a device similar to a pulse oximeter, we reached out to a public institution in India for partnership in terms of designing based on human factors engineering and putting together the circuitry. Currently, as we complete the first phase of validating the process, we are also compiling a patent application by working with the institutional intellectual property office, which requires a bit of legal knowledge on our part as well since it’s a techno-legal document.

### **Chapter III**

“Have you noticed that each baby is crying differently, with distinct pitches and intensities; even the rhythms are varied!”, I told one of the pediatric residents in the Neonatal Intensive Care Unit. “They are just vocalizing their distress,”, she mentioned. “Are different cries associated with different distresses?”, I thought and looked up on the internet, only to realize the immense potential cries have as a diagnostic marker. Given that cries differ substantially in birth asphyxia (breathing difficulties), inborn heart diseases, and autism spectrum disorders, leveraging this could help in early detection of such disorders which is limited especially in underdeveloped nations. Having read a bit about artificial intelligence, I contacted some of my friends who were doing their PhDs in Machine Learning to understand if we could design a device based on ML algorithms to elicit potential abnormalities based on cries. Several professors and instructors of pediatrics were also excited at the prospects and willingly joined the team. Most of our discussion sessions revolve around technical details such as features of the cries to be extracted and the precise algorithms to be used for classification. We have collaborated with a 3D-printing expert as well for producing a minimum viable product. As the technical details and the initial patent application are getting finalized, we are also preparing for applying to Harvard Innovation Lab for incubation and funding support. As I keep working towards my goal of becoming a medical device entrepreneur, a perfect blend for the physician and the engineer inside me, these three chapters in my life highlight the impact a collaborative approach with a team having diversity of expertise can have in bringing ideas to life, ideas which could benefit millions of lives globally.