David Putrino

Hacking Health

How to Make Money and Save Lives in the HealthTech World

Springer

Hacking Health

David Putrino

Hacking Health

How to Make Money and Save Lives
in the HealthTech World

David Putrino
Icahn School of Medicine at Mount Sinai
New York, NY
USA

To Dr. Jean F. Coppola, who taught me how, when, and why to use technology to enrich communities and impact public health. Your vision, passion and friendship will be greatly missed.

Acknowledgements

Writing any sort of book tends to be a fairly solitary and selfish endurance event. As such, I am incredibly fortunate to have an incredible support network of wonderful people who helped me through this process. Thanks to these people, I even managed to have a bit of fun writing this one, and I hope some of that comes through to you all. I am especially grateful to the following:

To my wife, Rose, for putting up with all of the complaining, late nights and early mornings with (mostly) good humor and lots of love.

To my parents and brothers for bringing me up in a loving, supportive, and enriched environment that has kept me curious, confident, and motivated over the years.

To Nichole, John, Bunny, David, Robin, Marta, Phil, and Rachel for patiently sifting through all of the disorganized thoughts that made up my first drafts, helping me to make this thing readable.

To Rusty, Brandy, and Brad for all of their amazing reading recommendations.

To Flux, for his amazing animations.

To our dog, Brasky, for taking me for daily walks.

Contents

About the Author

David Putrino is physical therapist with a Ph.D. in Neuroscience. He worked as a clinician in Australia, before moving to the USA to study computational neuro-science at Harvard Medical School, MIT, and NYU. He has served as a Faculty Member at Weill Cornell Medicine and Burke Medical Research Institute. He is currently the Director of Rehabilitation Innovation for the Mt Sinai Health System and an Assistant Professor of Rehabilitation Medicine at the Icahn School of Medicine at Mt Sinai. He works to develop innovative technology solutions for individuals in need of better healthcare accessibility. He consults with the Red Bull's High Performance division, using evidence-based technologies to study and improve athletic performance. In his spare time, he volunteers for Not Impossible Labs, a group that creates disruptive technological solutions for high-impact humanitarian problems. In addition to a number of academic publications, many of David's projects have been featured on ABC, Sports Illustrated, the Wall Street Journal, the BBC, Time Magazine, Wired Magazine, and the LA Times to name just a few. He lives in Brooklyn with his wife and dog.

Part I
Nuts and Bolts

"I was taught that the way of progress was neither swift nor easy"
                                                            —Marie Curie

I was eight years old, laid out flat on a big rug in the living room of my parents' home in Western Australia. I was watching *Star Trek IV* (circa 1986) with my brothers: It's the one where Captain Kirk takes his crew back in time so they can save the whales. I was completely enthralled…even at eight years of age, I was already a massive nerd. There's this fantastic scene in the movie: Pavel Chekov, the Navigator of the U.S.S Enterprise, has sustained a head injury and lies comatose in a 1986-era hospital in San Francisco. Chekov is in a lot of trouble—the surgeons in the hospital are looking to drill a hole in his skull so that they can relieve the pressure on his brain. He is at the mercy of twentieth-century medicine, and things are looking real bad. Just as the "primitive" surgeons are preparing to scramble our favorite navigator's brains, the hilariously sassy Doctor Leonard McCoy sweeps into the operating room majestically. He brutally excoriates the surgical team and pulls a couple of small devices out of his pocket—the first effortlessly diagnoses the problem: a burst blood vessel in the brain; the second heals the damage in a matter of moments. Chekov is fully recovered, McCoy takes a final jab at the barbarism of 1986's medical prowess, and they leave the operating room in triumph.

Fast forward more than 30 years on from that fateful scene in Star Trek, and I'm ready to admit that TV may have lied to us. Health technology is on the brink of a revolution that we sorely need, but we're yet to hear the first shots fired. Most healthcare experts acknowledge that the unprecedented rate of global aging will place overwhelming strain on health resources. Traditional models of healthcare delivery will prove inadequate for dealing with the sheer volume of individuals who will be in need of quality care. The healthcare industry is facing an enormous gap in its ability to deliver care to a large number of underserved individuals. Technology presents the field with an unprecedented ability to bridge this gap. Many different and fascinating fields have emerged in response to the realization that pairing technology and healthcare may be beneficial: health technology (HealthTech), biodesign, electronic health (eHealth), bioengineering, biotechnology, digital health (dHealth), mobile health (mHealth), telemedicine, and telehealth just to name a few.