From the Boardroom

Keys for Building and Leading Teams for Innovation in Organizations: Three Book Reviews and Author Commentaries

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This "From the Boardroom" introductory article and the subsequent book reviews builds on a recent book review by this Editor that focused on "Why Startups Fail: New Roadmap for Entrepreneurial Success" (by Harvard professor Tom Eisenmann, also published in this edition of JCB. Eisenman's excellent book was based on a multi-company study of early-stage companies that succeeded vs. those that failed. He found that the extended team and its leadership are the most important predictors of success of an entrepreneurial venture. This finding, highlighted that leadership based on teams, partnerships, alliances and networks are important success factors in all industries. They are a means to create and sustain a competitive advantage to commercialize and bring innovations to market and fulfill unmet needs. Reading Eisenmann's book prompted me to now take a "deeper dive" into the essential components needed for success to build, grow, lead and sustain innovative organizations of any size – from startups through their emergent growth stages, and to maturity. This encouraged me to find other materials to complement Eisenmann's book.

In my opinion, the 3 subsequent "book review" articles in this paper provide a more in-depth view on this important topic related to success: *diverse teams, their collective and collaborative skills, their organizational culture, and their organizational ability to build networks; and, of course their leadership*. In effect, we highlight some of the "softer skills" needed to build successful organizations that employ collective intelligence, and its role in fostering innovation. These three books, published in early 2022, provide insights into unlocking strategic innovation in cross-industry organizations: one deals with the concept of *organizational collective intelligence*; the second with incorporating *design thinking and service design* into the organizational culture; and, the third focuses on *building and leveraging networks and alliances*. Each of our book reviews provided below includes short and focused moderated Q&A format exchanges with their respective authors.

The authors and books include:

George White's: "The Mystery of Organizational Collective Intelligence - a key to survival in a competitive world";

Kevin Bethune's, "Reimagining Design: Unlocking Strategic Innovation; and,

Mikel Mangold's, "Today's Superpower: Building Networks".

For full disclosure: these three authors are well known to this author/Editor. The first author, George White is a former faculty colleague at Carnegie Mellon while he was based at our Doha, Qatar campus; the second, Kevin Bethune was a former MBA student at the Carnegie Mellon Tepper School of Business; and the third, Mikel Mangold is a current collaborator on the topic of corporate networks, alliances and ecosystems organized to drive transformative innovation. I met Mikel recently through another collaborator (Diana Joseph) who founded the Corporate Accelerator Forum where Mikel was engaged while he was at Bayer.

The methodology employed is that each book is summarized and highlights key attributes related to the topic of creating transformative innovation across industries. We also included some background about the author and his qualifications and motivations for writing his book; identified and summarized my takeaways for potential readers of each book; and, then framed some questions for each author – and their responses. Without reservation, I'd highly recommend each of these books as great sources of information on innovation for our Journal of Commercial Biotechnology audience. While most of their experiences are derived from cross industry companies, I found that their perspectives are "right on"

for addressing the special challenges of the biopharma industry as it evolves globally to provide collaborative solutions for use in the broader, international healthcare industry.

"THE MYSTERY OF ORGANIZATIONAL COLLECTIVE INTELLIGENCE - A KEY TO SURVIVAL IN A COMPETITIVE WORLD" (PUBLISHED BY ETHICS PRESS, 2022) - A BOOK REVIEW SUMMARY AND INTERCHANGE WITH DR. GEORGE M. WHITE

This book provides an extensive overview and summary on the emerging understanding of collective intelligence which we view as an essential part of the "organizational DNA". We define collective intelligence below. This domain of organizational behavior has emerged in recent years as academics and practitioners have studies and written on the field. As background, Dr. White started his career pursuing post-doctoral studies in artificial intelligence at Stanford University, and went on to join the pioneering Xerox Palo Alto Research Center (PARC) where key technologies were invented and put onto the commercialization pathway. Many of these emerging opportunities led to a large number of startup companies, and others fueled the growth of tech companies like Apple and Microsoft; but, surprisingly not Xerox. Dr. White has extensive experience in entrepreneurship, creating three startups while in Silicon Valley. He joined Carnegie Mellon University in Qatar where he taught entrepreneurship and new business creation, and carries out research on innovation, collective decision-making, and emotional intelligence. So, he is well qualified to write about the topic of collective intelligence.

Interestingly, and as background, Xerox was an established, market leading company that started PARC in Silicon Valley (far from its Rochester, NY base) as a means to create a new culture. PARC was designed to identify potential new commercial opportunities for Xerox and/or others, in a broad range of computer related technologies. The thesis is that this source of new (at the time) technology would provide a means to prevent disruption of Xerox by early stage emerging companies. While we do not report on that here, inventions at PARC did lead to many successful companies, but failed to help Xerox because cultural and organizational reasons prevented their adoption and commercialization (many of them covered in the book by White). In fact, and in my opinion, they are related to failure of Xerox (and other large, non-nimble market leaders) to respond to disruptive threats, and on their failure to incorporate collective intelligence into their own organization and culture. So, they were unable (or unwilling) to pursue this unique source of innovations necessary to sustain their position as a market leader. We note parenthetically, that at one point, the market cap of the portfolio of PARC spinoff companies exceeded that of Xerox!

With respect to the author, after considerable experience in the Silicon Valley startup ecosystem, George joined our entrepreneurship team at CMU, and he became deeply immersed in our CMU team that participated in the emerging Qatar national strategy to transform and diversify its economy based on natural gas. They chose to educate their population to pursue entrepreneurship as a means to change the innovation culture of what turns out to be a very entrepreneurial country. The book authored by George, not surprisingly stresses the importance of collective intelligence in government organizations in addition to for-profit and not-for-profit organizations. So, it did not surprise me that in his book, George would pursue a better understanding of organizational intelligence as a competitive advantage for companies, not-for profit organizations, and even countries as a competitive advantage for the pursuit if innovation and leadership. Considerable examples are included in his book. His background uniquely qualifies him to discuss the topic of his book with his very broad and diverse experience with organizations. I recommend this book especially for entrepreneurs and innovators in any industry, since this topic is not widely understood outside of academia. Over the last few years a literature search identifies that Organizational Behavior faculty are performing research and translating it into practical applications carried out by their students into the world beyond academia; a form of "tech transfer" from academia to industry. It is to the misfortune of companies that do not develop a working understanding of collective intelligence, and that these organizations continue to be disrupted. Indeed, most organizations struggle to find "the secret sauce" for building competitive advantage in the world economy. The White book does provide a considerable number of great examples in this regard, and these cross both industries and national borders. We, will leave it to others to discuss the academic underpinnings of collective intelligence as the field emerges. White's book does include some of those discussions. We follow with the "tip of the iceberg".

The book starts with a discussion on how collective intelligence is defined. Wikipedia defines organizational intelligence as "the capability of an organization to comprehend and create knowledge to its purpose; in other words, it is the combined intellectual capacity of the entire organization". Wikipedia". In his preface White states that "collective intelligence (CI) is the ability of

groups (or teams) to make better decisions than individuals acting alone. "CI is determined by a variety of factors that can be manipulated by organizers or sponsors". He further states that "without control of these factors, groups are no smarter than any one individual." Further, "there are organizational principles that consistently enhance organizational performance". Over time, only the more intelligent businesses and nations survive through their superior platforms for discovering knowledge, sharing it, and acting on it". "Disrupted companies decline since their DNA does not adapt and learn fast enough to meet the challenges of the disruptors." White points out that IBM had the opportunity to be Apple, and Blockbuster could have been Netflix. He also notes the success of Xerox PARC and its ability to spinoff innovations, and transfer some potential innovations to emerging Silicon Valley companies; much to the well-known and tragic decline of the parent Xerox caused by their inability to adapt and commercialize these innovations. Since our audience at JCB is made up of pharma/biotech/MedTech, and digital health organizations (emerging), think of what biotech company could have become Roche, or J&J just to name two. Or why did Watson fail at IBM? It is not the technology, it is the collective intelligence of the organization that provides the insights to harnesses the potential to transform, and adapt organizationally to commercialize successfully and successively.

And that leads White to bring up the work of the late Clayton Christenson with Hal Gregerson and Jeff Dyer the authors of the "Innovators DNA". This book is one of my favorites also, and I believe framed my interest in the topic of collective intelligence. This excellent study provides what I would define as the ingredients (or DNA) of collective intelligence for teams, units, and companies, i. e. for any organization whether it is for profit, not for profit, or government. The key "base pairs" of the Innovators DNA include *5 key elements: associative thinking, questioning, observing, experimenting, and networking*. This editor can think of no better way for an organization to frame, develop and harness the power of collective intelligence for innovation. Of course that is easier said than done. Over time, we may see that the Innovators DNA might in fact be a way to think about how to organize, in order to incorporate all of the factors needed to innovate continuously, but that is yet to be proved. Focusing now on biopharma, we as an industry have evolved to innovate based on collaboration thru networks and alliances spanning the globe. These alliances include academia, national labs, startup and emerging companies, and the larger and emerging pharma/biopharma industry itself. While all industries network and partner, the biopharma business model has demonstrated that collaboration across the value chain at all levels is necessary.

This short overview provides the essence of CI, but I hope this summary incentivizes you to read the White book and see how it would apply to your organization (company, university, government organization, etc.) at any stage of its evolution from startup stage on thru its life cycle to maturity; be the disrupter not the disrupted. All of the material discussed above is covered in Section One of the book.

White then goes on in later parts of Section One to look at how crowd sourcing can promote diversity, even in cities and regions. If you are interested in a case study dealing with the evolution of an "intelligent island; Singapore" is included in Chapter One. Chapter Two focuses on some of the tools used by pioneers in CI, including a short description of the pioneering work of Richard Florida who studied "people" living in evolving cities like Pittsburgh and Toronto. Chapter Three then focuses on "thought leaders" and their organizational genes for innovation. This perspective includes both academic investigators as well as non-academics.

Section Two of the book discusses the Rise and Fall of great companies. This includes the pioneering work of Jim Collins with Jerry Porras ("Good to Great:) Tom Peters and Bob Waterman ("In Search of Excellence:), and Clayton Christenson ("The Innovators Dilemma" and "The Innovators Solution"). Later in Section Two, White also covers the remarkable cultures of very successful organizations like IDEO (where design thinking and service design are an essential part of the corporate DNA) – we cover design thinking and service design in the Kevin Bethune book. This section also incorporates Google and it's parent Alphabet as examples. Alphabet has successfully innovated in technology and in healthcare and continues to excel in what is a very diverse, fluid and evolving organization – culturally, technologically, and geographically.

Section Three deals with the topic of National Collective Intelligence. My first inclination is that this topic may be beyond the scope of J. Commercial Biotechnology. However, upon reflection governments do play a very important role in our evolving global biopharma ecosystem. Consider for example: funding of university research (and at national laboratories) and emerging company R&D (the Small Business Innovation Research - SBIR program), Patents (IP), Regulatory, and Reimbursement. So, governments are a very important part of our ecosystem and should be an active participant in the invention, development, commercialization of the transformative technologies that are emerging. In my opinion this is an area for further discussion. Note that in the book George has expressed his opinion based on his personal experience in Qatar and in Singapore.

CONCLUSIONS AND PREFACE FOR AUTHOR Q&A

As I read this book, I reflected thru my own career and realized that my experiential definition of Collective Intelligence and Leadership originated from my first immersion into "the entrepreneurship world" after finishing up my grad work and a short tenure-stream faculty experience at Yale. I left to pursue more practical applications centered around my academic training. So, I took an entrepreneurial leave and found my way back to San Diego, CA and to SAIC (Science Applications International Company) based in LaJolla – just "down the beach" from UC San Diego. I spent 10 years of my professional life there including playing a role as Sr. VP in that unique and rapidly growing organization. While I have been following the emerging academic literature about the emergence of collective intelligence, I thought my experiential perspective at SAIC is worth sharing with our readers. This experience comes to the top of mind as I try to frame Collective Intelligence for any industry ranging from tech to biotech and to healthcare more broadly. In addition to the traditional means for employee engagement and collaboration, we used *employee ownership* through an enlightened ESOP as a key motivator for growth and performance. I add parenthetically, in the current world of VC funding, any form of employee ownership is a key motivation to enable a collaborative culture (there are important differences between VC funding and employee ownership, especially relative to control and returns on investment. But, we will reserve that topic for another time).

As background, our principles at SAIC were similar to what I read in the White book. At SAIC, there was a poster on the entry wall to our founder and CEO Dr. J. Robert Beyster's office. It clearly and succinctly explained the SAIC culture: *"All of us is smarter than any of us"*. Beyster, or JRB, was the charismatic founder and long-term CEO of SAIC. He led the company from founding into an $8B organization, based on the principal of employee ownership – literally and figuratively. As explained in the book, "The SAIC Solution" (c. f. J. Robert Beyster with Peter Economy; Wiley, 2007), the culture is based at its highest level on Three Principles: 1) "People First; 2) "Incentivize all through employee ownership"; and, the wild card is 3) to "Experiment and refine the organization constantly". We organized for profitable growth and diversification, and used our own version of "agile innovation" (before it's time) to respond to market need and to reorganize iteratively to exploit opportunities. We also set up offices close to customers to be even more responsive (these were pre-internet days). Those who contributed, advanced and were compensated financially and/or promoted; those who did not left or were asked to leave. So, in retrospect we built a company that succeeded because of many reasons; however, the underlying magic was to leverage our collective intelligence to respond to markets identified thru employees who were incentivized through their equity

ownership. Since then, I've never personally encountered an organization like SAIC, and it framed my own leadership philosophy over the years.

Building and leading diverse teams, certainly is important at all stages of an organization ranging from the early stage on through maturity. At SAIC (pre-internet and zoom, we had teams spread across the country and we collectively reached the $1B revenue level within about a decade after founding. but it seems to me that in the internet age, building CI (collective intelligence) into networks and alliances is much easier and more powerful. But, clearly it is never easy. We talked about and learned about CI in our frequent management retreats, but at that time the academic base for understanding of CI was barely emerging in academia. So, we brought in faculty from MIT and Stanford to coach us on the underlying principles. Most importantly we adopted the mantra on JRB's door - *"All of us is smarter than any of us"*.

Q&A - QUESTIONS FOR DISCUSSION WITH GEORGE M. WHITE

Q1. Would you agree that the following might be a playbook for leadership of CI?
- Share responsibility and accountability with a focus on empowering employees
- Align strategic direction to attract and retain diverse talent.
- Provide different opportunities
- Create "win-win" agreements.
- Adopt a style that supports all employees.

GMW - Yes, this is a nice list and undoubtedly would promote collective intelligence. I might change the wording in a few places to emphasize different parts of the underlying theory.

Regarding your first point, Collective intelligence means, by definition, decision-making involving consideration by many minds. So empowering employees to make decisions after giving them the information they need should be the objective of corporate governance.

Regarding your second point, diversity is known to be helpful; and having a strategic direction that inspires people is certainly helpful to recruiting. There is a subtlety here. The best run companies involve the least explicit management because employees know the strategic direction and can make good decisions without being told what to do in detail.

Regarding your third point, providing different opportunities, having different opportunities increases employee happiness and happy employees are definitely smarter and more productive than unhappy ones.

Regarding your fourth point, creating win-win agreements increases information sharing between negotiating parties and having more information under discussion always increases intelligence.

Regarding your fifth point, employees hunger for "fairness". They are definitely more productive & creative when they feel they are treated fairly, when the playing field is level and their contributions will be recognized.

Q2. What tips do you have for building CI into the corporate culture currently, especially with diversity in the workforce in sexual identity, nationality, and in expertise and level of education?

Employees need to know they are appreciated as people, not simply "recognized" for their ability to mechanically produce results. So you want to build a "people oriented" organization that acknowledges that diversity is an asset because it promotes creativity. Being "people oriented" means involving employees in goal setting, and having frequent reviews. Do you see differences between virtual and remote teams, and if so how they can be resolved?

GMW - I'm not sure how to interpret "virtual team", but I suspect that developing trust between people and automatons would be difficult. Having a team member who is remote but nonetheless offers the possibility to get to know and trust would be better than working with an AI program remotely.

AAB - Working CI into the corporate culture is one thing, but building it into an alliance network would appear to be quite challenging. Any insights here?

GMW - CI can be increased in alliances by having good information exchange and a clear understanding of mutual objectives. This would be facilitated by having formal representatives for each member in the alliance whose job is to gather information that honestly reflects how their constituents feel. The members would communicate those feelings to other representatives in the alliance through regular reports, electronic meetings, and through semiannual face-to-face meetings. Having discussions between the representatives is the key here. Collective intelligence emerges from give & take discussions. It's important that discussions be focused on common objectives, which would usually be dealing with external threat or competitive pressures.

AAB -Any advice on how you build and organize teams. What is the role of the leader of effective teams and organizations? Democratic, Coaching, Cheerleader. Leading from behind?

GMW - Effective teams are composed of people with common interests, objectives, and motivations. When they have discussions, they are filled with enthusiasm and engagement. If someone ends up on a team who is not enthusiastic, they should be removed from the team. The best leaders always show interest in everyone and in meetings they extract opinions from everyone making sure that participation in discussions is balanced. Formal decisions should include opportunities for voting, and anonymous rank order voting when practical. Leaders should be moderators and not bosses. Leaders should think of themselves as cheerleaders promoting group opinions, and not an authority telling his troops what to do. Outside of formal meetings, the best leaders always are respectful and humble.

AAB - From your book, CI is important in governmental, for-profit companies, and non-profits, and. Can you reflect on commonality and differences?

GMW - Collective intelligence, by definition, exists to promote organizational survival. In a "for profit company", CI would be concerned with profit maximization and minimization of competitive threats. Profit maximization would mean optimization of supply chains and internal operations. Nonprofits are not concerned with profit maximization so some of their objectives are different; and they draw their funding from trusts or wealthy individuals and they generally attempt to accomplish humanitarian objectives. CI for both nonprofit and for-profit organizations would be promoted by technology and processes for information gathering, information sharing, group decisions, equality between decision-makers, optimism and noble organizational purpose.

Collective intelligence for government is a little different. CI for government means freedom of the press, and laws preserving the spirit of the Freedom of Information Act of 1966. The spirit of the law is free and ready access to all information from all government-funded research except when national security might be jeopardized.

CI in governments could take better advantage of crowdsourcing to get opinions on most issues, as is being tested by ARPA in their Good Judgment Project. They could also use "Deliberative Polling" as promoted by James Fishkin of Stanford University. Fishkin actually developed a system circa 1988 for extracting the collective intelligence of citizens on government legislative issues before collective intelligence was recognized as a discipline. The idea is to identify a representative sampling of citizens and invite them to a single location to discuss issues over a weekend. Typically this would be a few hundred people. These people would be put into teams of 10 people with a moderator to discuss issues. The conclusions of

discussions would then be announced to the entire assembly. One of the key developments of collective intelligence was the discovery that a properly moderated discussion between three or more people always improves over individual decision-making. Fishkin incorporated the benefits of this principle into his recommendations in 1988.

Q3. Can you give us some good examples as role models for implementing CI? Can you comment on some market leaders in biopharma, and their alliances both before, during and post Covid-19. Any tips on incorporating Collective intelligence in alliances?

GMW - The best examples for implementing CI would be Walmart, Google, Zappos and Semco.

Sam Walton is reputed to have said "We at Walmart are just absolute fanatics about our managers and buyers getting off their chairs and getting out into those stores. We've drummed into their heads they could come back with at least one idea that will pay for the trip." Walmart also pioneered stock options for employees and holding large company meetings to share information. They beat their competitors (Kmart, Sears, JCPenney, A&P) because of their superior collective intelligence.

Google is famous for saying managers are not supposed to manage: they are not to decide by themselves who to hire, who to fire and whom to promote. (These are supposed to be committee decisions.) Furthermore, the defining aspects of Google culture are its lofty mission statement (to index the world's information and make it available to everyone); transparency (to share confidential information broadly within the company) and voice (let everyone in the company have a say in how the company is run). These things all promote the CI of the company.

Regarding Zappos and Semco, these organizations are true paragons of collective intelligence. They not only share authority and responsibility, they allow their employees to set their own salaries and working hours.

Q4. Use of AI is relevant especially for the emerging digital health sector of our industry. Any thoughts on implementing collective intelligence in medical decision making?

GMW - The end result of the practices of collective intelligence is to capture and share information. When it comes to training AI systems for medical applications, the remarkable fact is that training a single robot, or a single AI system, can essentially be trading them all globally because they could share the same computer code wherever they are on earth. Conversely, they can all be contributing training data to a central deep learning artificial neural net, the heart of AI.

Practically, different researchers engaged in tackling the same problem need to get together and share data. But the amazing thing is that this is possible to do in the first place. The fact that collaborating AI developers can share training data and/or share the finished AI product electronically around the globe means that progress can be accelerated the new drug development and improve diagnostic monitoring.

"REIMAGINING DESIGN: UNLOCKING STRATEGIC INNOVATION" BY KEVIN BETHUNE (PUBLISHED BY MIT PRESS, 2022) – A BOOK REVIEW SUMMARY AND INTERCHANGE WITH KEVIN BETHUNE

Abstract - A review of this book for J. Commercial Biotechnology might seem a bit unusual, since "design" is not usually associated with biopharma, and at best loosely understood with medical devices. We think of bringing technology and business together, but design and its place within an innovation team is not widely understood and employed in our industry. We do note that incorporation of design into the "innovation playbook" is a bit more likely within the emerging field of digital health. However, in our opinion, the field of design thinking and service design is all about understanding the needs of the customers and users, and translating that understanding into new products and services that are wanted by customers and payers – and, that will be adopted and evolved in the market. In fact I have written in JCB on these topics in several recent publications, especially focusing on digital health innovations (Boni & Foley; "Challenges for Transformative Innovation in Emerging Digital Health Organizations: Advocating Service Design to Address the Multifaceted Healthcare Ecosystem"; JCB, Vol. 25, No. 4, pp 63-73, 2020): Boni and Abremski; "Commercialization Challenges and Approaches for Digital Health", JCB, Vol. 27, No. 1, pp 12-19, 2022). As noted in these publications, design thinking and the practice are vital to the advancement of our industry as we try to align the interests and serve the needs of a very diverse set of interests, in this complex, competitive marketplace. There is not one customer or user, our market ecosystem consists of patients, providers, physicians/nurses/caregivers, payers, and regulators. Drugs, vaccines, devices, surgical and monitoring devices all need to be conceived, designed and

developed to fill unmet need for this ecosystem.

Introduction - The Bethune book is very thorough, timely and unique. It is written from the perspective of an engineer turned into a well-known product designer who also has an MBA. So, he blends technology, business and design. We share that blend of skills and experiences. The book is very comprehensive and written by an informed designer and I recommend that it be read by anyone interested in design thinking, design, and innovation in any industry. The parts selected for highlighting in this review, are those that I consider to be most pertinent to those in the biopharma industry, since I do believe that audience can greatly benefit from the insights and observations of the author regarding innovation in complex industries. And, in my opinion biopharma, MedTech, and Digital Health stand out as being a challenge for the most well intended potential innovators.

As background, while I was leading the entrepreneurship program at Carnegie Mellon's, Tepper School of Business, we developed a Capstone Course for our graduating MBA students in entrepreneurship. This course is intended to frame a new business opportunity, and is aptly titled "Designing and Leading a Business" (DLB). The objective of a Capstone course, is to integrate the learnings from the entire MBA curriculum, so it is very interdisciplinary. Appropriately DLB was designed and co-developed with me (entrepreneurship, business, and technology) with Laurie Weingart (from our Organizational Behavior and Theory Group) and Shelley Evenson (from the CMU School of Design). This interdisciplinary leadership team brought together interdisciplinary teams comprised of technologists/scientists, business, designers, to create a new business together as a close knit, interdisciplinary, founding team. I quickly learned that coaching interdisciplinary teams and collaboration were developed much better than any one of us (leaders) could do alone. We also saw the power of integrating innovation teams of students from business, engineering, science, and design. We eventually took this course to Silicon Valley for an even greater "deep dive" into the innovation and design communities based there to fine tune and evolve our own course design through interaction with leading founders, CEOs, and venture capitalists. And a few design firms like IDEO, Frog, and companies that had adopted design thinking like Intuit, Google, and others.

The author of the book "Reimaging Design: Unlocking Strategic Innovation", Kevin Bethune participated in an early version of our DLB Capstone course in Pittsburgh. He is trained as an engineer, practiced product design at Nike (designing athletic shoes for the Michael Jordan line), and then went on to study design at ArtCenter College of Design in Pasadena, and to a successful career as a professional designer, entrepreneur, and author. Most recently he founded and serves as chief creative officer of a new company "dreams • design + life".

Bethune's new book explains why "good design, multidisciplinary team collaboration, and diversity are the foundations needed for innovation" – in any industry.

Review Summary – In the first, three introductory chapters of the book, we get Kevin's perspective as an engineer who transformed through education and experience to one who understands and applies design thinking to innovation. He explains his understanding of design thinking and why design thinking is relevant to any business seeking to innovate. Bethune says that design thinking represents two things: 1) "the philosophy or mindset that focuses our attention on the unmet needs and friction facing humans" who are charged with innovation in our businesses and institutions; and 2) is an invitation for other disciplines to enter into a professional's creative, problem solving process that includes "diverging and then converging" as they seek and pursue discoveries" of "need in society". This design inspired convergent and divergent process underlies the utilization and successful application of the lean startup methodology (through successive iterations of ideation, conception, and design/development). He believes that "the future requires more of us, and we need to rely upon different actors than we have in the past" – diversity drives and underlies the collective intelligence of the organization. More, and synergistic functional disciplines will be required to collaborate in any organization seeking innovation. And, this extends to and into the boardroom! Additionally, different agents (or glue) are required to tie the diverse inputs together. He goes on to observe that "designers can serve as powerful spearheads to catalyze team chemistry for the normality that's quickly arriving. In effect, he advocates that "design should become an equal partner in business strategy and implementation. Multi-disciplinary convergence should be valued as a way to innovate in organizations themselves, and in the products, and services that they strive to invent and commercialize. I'd suggest that the biopharma industry, broadly speaking, would benefit significantly from this perspective, especially since this industry has the most complicated value proposition (s) possible to develop and communicate to the diverse constituencies that are involved in the success of products and services (noted above in the introduction to this review). Complex indeed: who is the user, who is the customer, who is going to pay, who is the partner, etc. And of course let's not forget who is protecting the safety of the public, i. e. the regulator.

Chapter Four of the book is titled "Creating the Future", and brings in the ever-famous Venn Diagram (the 3 overlapping domains of Design, Business and Technology). Bethune points out the importance of the people and their talents (team) that leverage these three elements to create and deliver needed and valued innovation(s) to the market (the jobs to be done, the

executors, and the context). The "multidisciplinary team gives an organization the ability to see the future through a number of different vantage points"; and to systematically map the value creation for all of the stakeholders. Don't just look for "pain points". Instead creatively uncover what the market (the job executors) actually cares about. In that regard, he argues for the use of one of my favorite tools (the Business Model Canvas) to rationalize and articulate each of its 9 elements. It is a very important tool to align all of the elements of the business model to reach consensus. All must be aligned to create a new future. Kevin refers to this as "the Art of the Plausible" through the power of the interdisciplinary team. That is the big takeaway.

Chapter 5 focuses on the impact on inventing, building and scaling with use of design thinking. Since entrepreneurs and inventors start from "zero" – they are the potential disrupters. They can learn and pivot more easily. Larger, established enterprises start with the other extreme or "wrestling with the realities that come from their scale, and do not or cannot pivot as easily". They start with what Bethune refers to as "the fuzzy front end" or a period of ambiguity as they contemplate, explore and re-explore new product offerings. How do they replace their existing offerings with better performing products, services and business models? While maintaining and satisfying their current customers with their evolving "features and benefits". His advice is to achieve market traction through market relevance and a healthy dose of humility. In effect, emulate the startups by getting something out there, and with a dose of humility, get feedback. He defines innovation as "bringing something new to market with commercial success across these dimensions - "desirability, feasibility, and business viability". We achieve this through the story of a user's experience that represents the new idea. "What story are we telling"? Graphically this is represented by the double diamond of discovery and idealism.

Chapter 6 is about including and leveraging the strength of the team. It is titled appropriately for this book "rewiring to position design at parity". Parity does not mean lead, nor does it mean to follow. It means that all team members and their inputs are valued. When I read this I was remined of the quote that Laurie Weingart found, and we used to lead off our sessions on building teams". Recall that she was my organizational behavior partner for the DLB capstone at CMU. *"The strength of the team is each individual member. The strength of each member is the team."— Phil Jackson.* For non-pro basketball fans, Jackson was perhaps the most winning NBA coach. However, Kevin used an orchestra analogy as a lens to look through when building and leading multidisciplinary teams: *"leading a multidisciplinary team is like managing and orchestra"*. The leader needs to look at different players and different times for them to lead, e. g. clarinet, saxophone, trombone, etc. depending on the situation. In each discipline leads change as appropriate. Take your choice between basketball and orchestra as you think about interdisciplinary teams. Having both breadth and depth are required on the team. Accordingly, the strengths of each team member, deep subject matter expertise in this case, can be leveraged when needed. It is up to the leader to recognize that and to lead appropriately. Sometimes the lead is business, sometimes technology, sometimes design. The leader is meant to facilitate synergistic decision making – perhaps this is another way to describe collective intelligence where diversity is a strength. Kevin framed this discussion thru his experiences at BCGDV (Boston Consulting Group Digital Ventures).

This Chapter concludes with a discussion of the "4 superpowers of design: to uncover the deeper "why"; the ability to "place yourself in other people's shoes"; while this sounds similar, you really experience the user experience; and, extra-sensory perception that engages all of the human senses (sight, sound, taste, smell, tough, etc.). I'd describe these 4 as the ultimate "user experience", or often referred to as UI/UX. This editor is not a professional designer (other than my first jobs in the aerospace industry as design engineer, and then development engineer). But, reading this section really does bring out how design brings superpowers to multi-disciplinary teams and their ability to solve problems.

Chapter 7 deals with using design transformation to shape your organization for new realities such as our nation faced and continue to face the challenges of Covid-19. In parallel, Bethune notes the emergence of Black Lives Matter, the 1619 project, unconscious bias, and of course the exponential rise of computing, artificial intelligence, facial recognition, etc. The author states his positions in each of these challenges and that diversity, equity and inclusion will continue to be critical for society as well as for organizations. We in healthcare will be increasingly challenged with designing our products and services to anticipate and deal with these issues. So, we should focus on the design of our products and services with these realities firmly in mind. And, more importantly to include those who understand these issues into our organizations.

Chapter 8 is the concluding section of the book and it appropriately titled "Mirroring Our Diversity – Reflections for Our Future". This section talks about "how organizations will imagine how to leverage design more strategically than before, and how to carve out bandwidth for teams to collaborate in multi-disciplinary ways". We need to think about design as more than beautification, but an equal partner with technology and business as we approach innovation. Indeed, Bethune points out that even within "design", diversity needs improvement to bring in the whole human-centric approach as our society itself becomes more diverse. We need to learn how to leverage the frictions that exists to

stimulate innovation. "Maybe a start-up needs to incorporate design into its founding team. And, maybe an innovation department needs to ensure its studio reflects the multidisciplinary mix before it tries to spark new business".

As I conclude this review, I am struck by the insights provided by the author and how they affect any company in any industry. However, since I am writing for a biopharma audience I am also struck by how our industry should be an early adopter of design thinking insights. Perhaps it is time to adopt the lessons in this book as we try to innovate for a more diverse global market segments including biopharma, MedTech and Digital Health. In a recent publication focused on digital health written by Boni and Foley ("Innovation in Emerging Digital Health Organizations: Advocating Service Design to Address the Multifaceted Healthcare Ecosystem" JCB (2020) Vol. 25, No. 4, pp 63-71) we used three case studies in digital health including IBM's Watson.

Q&A – SO KEVIN, I'D APPRECIATE YOUR PERSPECTIVE ON THE FOLLOWING QUESTIONS:

Q1 - What do you think about augmenting the biopharma innovation team in digital health with design thinking to balance technology, business, and design as they address the multiple P's? If you took on an assignment from an emerging (or mature) organization, what challenges do you see in this market segment?

KGB - I think biopharma would definitely not be exempt in realizing the benefits that would come from augmenting their approaches with design thinking or including design practitioners within their strategic opportunities. If I were a design practitioner entering their arena, I imagine I would be awestruck by the tremendous scientific specialization and deep R&D infrastructure that exists across each department. I would also anticipate that the amount of bandwidth spent cross-pollinating across the different business, science and technology departments would be rather slim in the day-to-day operations. This might have been fine as biopharma companies scaled within their industry, but the converging forces in the broader landscape are probably threatening the first principles that have made the biopharma industry what it is. The value criteria across their stakeholders is likely shifting based on a wide variety of social, technological and regulatory shifts. Design will be needed to build muscles of future foresight and ensuring the business can consistently deliver relevant, flexible value propositions.

Q2 - Also please reflect on differences and similarities in biopharma, and MedTech? The technologies are different

(e. g biological and chemical vs. physical), but the team dimensions and challenges should be similar. Looking ahead at the broader set of challenges facing biopharma, do you have any other comments and observation on designing a future for modern medicine that is faced with an array of challenges ranging from novel vaccines, targeted therapies, extending the quality and duration of live for many people?

KGB - I view emerging and existing technologies as merely "enablers" or ingredients to inform new stories that characterize next-gen products, services and experiences. Our ability to leverage them will come from different places (e.g. biopharma originating from biological processes, and MedTech from physical product creation, etc.) and on different timelines (based on anticipated cycles of technological renewal). No matter the type of technology and the timing of when they emerge, the same team dimensions and challenges of realizing desirable, feasible, business viable and strategically aligned outcomes we be the same in overall approach.

Within Reimagining Design, I cite a number of different creative capabilities that inform the practice of design and its inter-relatability with other disciplines. One capability in particular that I would emphasize for biopharma and MedTech is building the muscles of future foresight. As the world changes faster and faster (thanks to accelerating computation and connectivity), the headwinds and tailwinds of change (i.e. trends) will impinge on stakeholder value criteria, whether it's payors, providers, regulators, etc. It will be important to derive innovations against a multitude of high-impact, certain and uncertain future scenarios, and not just have us design for the most likely future scenario we can forecast based on merely extrapolating recent phenomenon.

Q3 - In another book review on collective intelligence, the author George White reflected on the following questions and I'd like get your perspective: Do you see differences between virtual and remote teams, and if so how they can be resolved?

KGB - This question causes me to reflect on my own business' transition to virtual and remote work in response to the pandemic. Overall, I can say we kept the same approach to teaming. The imperative to bring disparate disciplines around one table is largely the same, just with a virtual table. Of course, we definitely missed the in-person subtleties of looking someone in the eye, sensing body language and being able to jump on the white board to get our collaboration going. At the same time, we did feel a silver lining in that our virtual paradigm allowed us to bring in other remote collaborators that we wouldn't have thought to tap

otherwise because a lot of pre-pandemic noise kept our noses down within our immediate spheres of influence. Leveraging virtual platforms like Miro, Figma, Slack, Notion, etc. gave us canvases and forums to seed ideas and have healthy exchange, whether in real-time or asynchronously. We figured out how to push our ideas forward.

Q4 - Working design thinking and processes into the corporate culture is one thing, but building it into an alliance network would appear to be quite challenging. Any insights here?

KGB - When we contain our thinking within the walls of one company and its culture, I worry that our aperture is too narrow to cultivate great ideas. I think back to when we were trying to stand up design within BCG. We couldn't pretend to have all the answers ourselves, and we surely leaned on outside design communities to share and exchange perspectives to make us smarter about the unknowns ahead of us. I encourage organizations to maintain a sense of humility that they don't have all the answers for their most pressing realities. As much as it pays to protect intellectual property and company confidentiality, there's a clear ROI for cultivating an open-source mentality when it comes to innovation and nurturing partnership potential with other players in the landscape. In a hyper-connected world, I believe open-source innovation and cultivating ecosystem effects leads to greater business value, because the stakeholders we have to serve represent a larger constellation that we've initially given credit to in past business precedent.

Q5 - Any advice on how you build and organize teams. What is the role of the leader of effective teams and organizations? Democratic, Coaching, Cheerleader. Leading from behind?

KGB - As teams become more multidisciplinary, and even more diverse from a DEI perspective, I believe the tact of the leader needs to change for innovation programs to be more successful, regardless of industry. I think every individual on the team will have the opportunity to showcase their unique breadth (i.e. ability to collaborate, communicate and align) and depth (i.e. their deep subject matter expertise). Therefore, the leader may need to orchestrate across many disparate views, and allow each team member the opportunity to lead and contribute at the right times and places during the cadence of work. I'm a fervent believer in leaders transforming into servant leaders with a penchant for sharing the ownership of the vision with their teams in the form of role clarity, tangible and objective measures of success, and appropriate feedback loops. Servant leadership is about giving your team members some runway, unblocking obstacles and getting out of their way to let each individual have some agency and autonomy to inform the path toward that grander vision.

"TODAY'S SUPERPOWER: BUILDING NETWORKS" (PUBLISHED BY NEW DEGREE PRESS, 2022). A BOOK REVIEW SUMMARY AND SIDEBAR DISCUSSION WITH MIKEL MANGOLD.

Overview - The author and I met just a few years back, when I collaborated with Diana Joseph (founder and leader of the Corporate Accelerator Forum) on a study of corporate innovation. At the time Mikel was still associated with the Bayer CoLaborator in Silicon Valley, and they participated in the Corporate Accelerator Forum. At the time, he was collaborating and co-authoring a very insightful paper for JCB with Diana and Susan Windham-Bannister - titled "What Corporates Can Do to Help an Innovation Ecosystem Thrive- and why they should do it" (JCB, Vol. 26, No.1, 2021). I discovered that Mikel had moved from Europe to Silicon Valley and networked successfully to connect to key players in the SV network. There, he gathered great experience and perspective in his own Silicon Valley immersion. Previous to the SV move, he worked for Bayer G4A (Digital Health Start-Up Accelerator) and then the Bayer CoLaborator (Biotech Start-Up Incubator) in San Francisco. He is now based in Berlin, Germany, and works as an Innovation Project Manager at NGK SPARK PLUG, Venture Lab, a business creation and investment hub with a $100M fund to establish new revenue streams in mobility, utilities and medical areas. Over his career he has demonstrated proficiency in building networks and became an "ecosystem orchestrator". He also extended his authorship from the co-authored JCB article to include his recent book, that I highly recommend. As further background, he is a chemist by training and very entrepreneurial in nature. His international experience includes: open innovation in digital health, pharma, energy, cleantech & mobility. His recognized expertise has been demonstrated in bringing diverse stakeholders and enabling constructive collaborations to a shared outcome.

Appropriately, he confesses in his book that, while he was trained as a chemist, he would not now major in chemistry, since while "pure chemistry is the underlying discipline, the fascinating part of chemistry is its connections to physics, materials science and biology --- it is the *collaboration between* them that is the actual driving force". Basically, his premise and observation is that "networks enable people to change society". Being a

true interdisciplinary engineer, scientist and serial entrepreneur myself, I can certainly relate to this statement. He then goes on to state that "today's innovations combine several disciplines, and that we live in a world of exponential technologies". *"Businesses today thrive and create meaningful change if the people working for that organization feel part of the mission".* Those introductory statements should catalyze any potential innovator to read this very interesting, and comprehensive "deep dive" book with a focus on "the art of building networks". It sort of reminds me of Guy Kawasaki's book "The Art of the Start". I read the Mangold book with enthusiasm, and found it to be very thorough and insightful. I highly recommend it for those who want to learn about building networks to innovate – from a large company, and early stage company, or both. I'd also encourage those in the not-for profit or government sectors to read it, as they reflect on their very important role in the innovation ecosystem. In any event, it is especially relevant to anyone who is interested in the broad topic of innovation, and in the ecosystems in which it thrives; or does not, and why. Collaborative networks are highlighted as keys to success, since in today's society, we really do need to innovate through global collaborations. Mangold provides a wealth of information and perspective in that regard. My caution is that the book is lengthy, but I have attempted to synthesize my review to the key points and hope that this more succinct review will entice the reader to dig deeper into book for more detail and "color commentary." I've set up the author discussion at the end of the review to cover some key ideas and concepts for the JCB target audience (biotech, MedTech and Digital Health), since they could use some further elaboration by the author.

Book Review Summary - As a brief perspective, we previously emphasized the enabling role and importance of networks and ecosystems in our special edition titled "Building and Leveraging the Innovation Ecosystem", edited by Boni and Gunn (c. f. JCB, Vol. 26, No. 1, 2021). This reference and the Joseph, Windham-Bannister, & Mangold paper noted above (loc cit) is a recommended supplementary reading on the topic on networks and ecosystems. Recall that we defined an *innovation ecosystem as a sustainable economic region composed of a critical mass (or network) of interacting organizations* that attracts capital (monetary and human), and is generally composed of the entire spectrum of parties and the networks that are required to support the creation of products and services and to generate economic value for the firms and its surrounding community. Essential ingredients for any successful ecosystem necessarily include the *networks that, simply stated permit interactions between the parties that comprise the ecosystem.* These include individual companies that work collectively to conceive, develop and manufacture their offerings over their entire life cycle ranging from small to large; and to the universities; hospitals; and to the financial institutions to provide capital; and, of course the workforce.

The Mangold book focuses on the "enabler" of the ecosystem, i. e. to the *importance of networks* that initiate and power the collaborative innovations that are much needed in our industry (or any industry). Indeed, over the last few years as the Covid-19 pandemic evolved, we have seen the power of networks and collaborations globally. We also reflect, as background, on the elements of the "Innovator's DNA" of Dyer, Gregerson and Christensen as outlined in the George White book on Collective Intelligence reviewed also in this volume. 1) *Networking is one of the critical elements of the DNA*, but also includes and emphasizes the use of 2) *associative thinking, 3) questioning, 4) observing, and 5) experimenting.* Mangold comes up with his own of traits that I'd coin "the Networker's DNA". Networking is comprised of the following 7 elements derived from his interviews with successful innovators:

1. Taking ownership and inviting others to participate
2. Blow up borders to embrace diversity and welcome new perspectives (no silos)
3. Be of (or add) value; and, give before you get
4. Start small, and grow big with a shared purpose
5. Do what others say can't be done
6. Go viral and build trust
7. Be bold and have "skin in the game" by creating credibility, reliability, and accountability.

He observes firsthand due to his French/German heritage, that while Europe is a scientific powerhouse (based on its universities), he notes that translation of the science into successful companies is somewhat stagnant, including biotech. Perhaps the networking and collaborations are not as well developed as in the US for example? This situation contrasts with the US that has extensive ecosystems and clusters focused on technology, biopharma and other industry segment across the US, and in particular to what he experienced in Silicon Valley; (c. f. our recent JCB Vol. 26 that focuses on ecosystems and networks) Only 30% of European startups have located in the superhubs of Berlin, London, Paris, and Stockholm, and that is lower than in the US mature ecosystems, clusters and hubs. *His advice is to focus on the mindset of individuals who have to adapt to thrive and create positive change, and to build networks that create knowledge, resources, and people.*

Part One is titled "The Importance of Networks for Innovation". In Chapter One (History of Innovation) he states that "our world's biggest problems won't be solved by governments, corporations, or billionaires. These larger systemic changes will be made by partnerships and networks created with a longer-term outlook to create positive change with a "sense of urgency". He advocates creation of a multi-stakeholder business model embedded

in a trusted ecosystem where people value honesty and accountability. He further advocates becoming part of the change vision, and to embrace change. Editorially, I would add the famous quote from Harvard professor John Kotter in his classic book, "Leading Change"; *"don't be a no-no"*! Instead, lead and/or be part of the change agenda. Recall Kotter's famous 8-step change model: create a sense of urgency, form a powerful coalition, create a vision for change, communicate the vision, remove obstacles, create short-team wins, build on the change, and then anchor the change into the corporate culture.

Mangold then goes on to recognize that innovation labs (e. g. accelerators, enlightened universities, etc.) and startups have become integral parts of tomorrow's innovation economy. Internal R&D is becoming less and less a source for corporate innovation as firms look outside to partner across the value chain. This is certainly true in the biopharma industry. An interesting set of statistics from an MIT/Capgemini study noted in the book is worth noting in this review. Sources of innovation are shifting dramatically from internal R&D to "innovation labs and startups". And, this shift is accelerating because of the impact on emergence and commercialization of "exponential technologies", especially in biopharma. He then uses one of my favorite examples for a role model in biopharma, Roche. Recall their partnership and then acquisition of Genentech in Silicon Valley (laying the groundwork for the biotech ecosystem centered in South San Francisco), and their more recent acquisition of Spark Therapeutics in Philadelphia (perhaps to accelerate the biopharma ecosystem there). One other highlight of Chapter One worth noting is the strategy that recently accelerated the Boston biopharma ecosystem (more on that below from the perspective of Windham-Bannister). This can be attributed to the academic culture, entrepreneurial culture, risk capital, workforce, infrastructure, and the ecosystem built up in Boston.

Here is a short synopsis of a few chapters. In Chapter Two (Networks Work; Here's Why), he focuses on networks that provide connections to others for knowledge, resources, and people. Solutions emerge from a combined top-down/bottoms up approach enabled by fewer hierarchies, and by employing agile, multi-disciplinary teams from within and outside of the firm. "The network approach works to get new ideas, attract resources, and to attract people". He further argues "the networks provide support and to a degree encourage risk", and different perspectives and viewpoints. (refer to the George White book on collective intelligence for further support).

Chapter Three (Six Things SV is doing right) is focused on the world renowned and multidimensional Silicon Valley (SV) ecosystem and network. Mangold points out that Silicon Valley is "a mindset, not a location" (quoting Reed Hoffman, founder of LinkedIn).

Data are also provided that shows SV as ranking first by far as the world leading innovation ecosystem (in multiple industries). Why is that? Since this book makes it clear that "networks activate and enable", Mangold's answer is covered by the following 6 characteristics of the SV ecosystem: *1) they have a "moonshot mindset"; 2) they fail fast, often and forward; 3) they have a culture of mentorship; 4) they have an event culture; 5) they grow communities and networks by sharing; and, 6) they have a well-coalesced ecosystem that connects all of the players.*

SIDEBAR- A PERSPECTIVE ON NETWORKS AND NETWORKING IN THE UNIQUE SILICON VALLEY ECOSYSTEM – THE PERSONAL EXPERIENCE OF A "SEASONED ENTREPRENEUR, EDUCATOR, AND EDITOR"

My own "backstory" on building and leveraging networks confirms Mangold's observations on the unique SV Ecosystem. I had considerable exposure to Silicon Valley during my private sector and then academic career, and over that period had built up a considerable personal network in SV, and from the CMU Alumni network. But, then I had the ultimate opportunity to leverage and build my network, and augment it via of my colleagues living in SV. Our objective was to set up a unique experience for a cohort of our MBA students who were taking our Designing and Leading a Business Capstone course at the end of their programs. After taking numerous short visits with MBA students there on "annual treks" for a number of years, we decided to take a deeper dive. This involved literally moving to SV for our last mini semester (8 weeks) while the students worked on validating and advancing their startup opportunities by access to networks in SV. We did this for the last 5 years of my career at CMU, prior to taking Emeritus status. To provide this opportunity, we expanded our Entrepreneurship Capstone course (Designing and Leading a Business) at the Tepper School of Business at Carnegie Mellon to provide an option for 15 to 20 graduating MBAs (from our Entrepreneurship Track) to move our base of operation from Pittsburgh to SV. The objective of this unique program was to build and leverage networks in SV to advance and validate their potential startups that had originated earlier in our entrepreneurship program in Pittsburgh. During this unique experience, we met for 3 full days each week – partially in "the classroom" at our SV campus, but the large majority was outside of the classroom engaging with the SV ecosystem thru real-world learning via

network connections, and processing the input to advance each startup opportunity. We literally traveled daily and met up with leaders of emerging companies, VCs in their offices, accelerators, etc. So it was basically a 24/7 experience for our period in SV. The majority of our time was spent networking and learning from the experts. And, getting feedback on our ongoing projects. We also incorporated round table discussions, panels and "pitches" during our "class sessions" at CMU's Mountain View campus at Moffett Field in Mountain View.

The program incorporated a central "design thinking component" imbedded into the program via a unique collaboration with our partners from the School of Design. This facilitated meetups with many of the design firms, and firms that incorporated design thinking into their cultures. We also leveraged our networks in SV to incorporate feedback from VCs, angel investors, and meetups with multiple Silicon Valley CEOs and their emerging and mature organizations. Some were CMU grads, but most were not – we went where the expertise resided, and augmented and/or leveraged our networks to get there. (Refer to our review of the Kevin Bethune book, "Reimaging Design"). Since this is just a "sidebar description", here is a short list to illustrate a cross section and diversity of firms that we visited: Google, Intuit, Linked In, Citrix, Lyft, Lunar, Cooper, Adaptive Path/Capital One, IDEO, Pixar, and Emerald Therapeutics. Accelerators included Plug & Play Technology Center, Playground Global, GSV Labs, and Y-Combinator; and, we included the Clayton Christensen Institute to learn more about disruptive innovation in multiple industries. We included about a dozen top VC and their firms ranging from "A to Z", in both SV and San Francisco. All of these visits were very illuminating to the students. Especially the VC visits, since getting meetings with top VCs can be daunting. But, since the Mangold book focuses on the importance of building and leveraging networks, we will highlight our annual visit with Heidi Roizen, then a partner at Draper Fisher Jurvetson located in the heart of the valley. She is a renowned VC, with a published Harvard School Case focused on her perspective on the "art and science" of building and leveraging networks (Ref. HBS 800228-PDF-ENG). Nothing like the opportunity to talk to a real world expert on the topic. We all learned a lot.

During this unique and popular program that spanned a 5 year period, we all observed in person, what makes the Silicon Valley culture unique and a world class model. So, I can personally ratify Mangold's perspective. Also during this period, we noted and observed the slow, but inexorable expansion of the SV ecosystem, as the "center of gravity" shifted northward from San Jose/Mountain View/Palo; and, into the city of San Francisco (where "the younger generation" wanted to live); and, into the East Bay (closer to UC Berkeley and the open spaces in the Tri-Valley region where companies could better afford to set up operations. We even spent time in Napa (my soon to be and current home) to learn about the "business of making and marketing wines" (and that is another unique ecosystem). We had to have some fun also! And, by the way, many of our graduating students set up base in SV and the East Bay after graduation, weeks after they returned to Pittsburgh for graduation. It is not surprising that the Bay Area is a top location for CMU graduates.

So, in closing this Sidebar, Mangold captured our experience exactly. It's not the location, "it's the mindset, the bold thinking, the availability of significant risk capital across the life cycle, the network of motivated entrepreneurial people, the variety of stakeholders, and their ambitions to transform society, ---." SV is truly a unique ecosystem, and as I always told my students, experience it and learn from it as you can. And, build you networks to partner with SV firms and VCs if possible, wherever you locate. But, in the meanwhile, please read Mangold's book for more detail and the perspective of the author who moved there from Europe, and landed a position in the Bayer accelerator – through the networks that he built!

Proceeding thru Chapters 4 – 7, we learn about some other key principles that are highlighted below. In Chapter 4, entrepreneurship is described by a familiar term, i. e. as *a "team sport"*. And, a most valuable skill is how to gather a team organized around shared intentions through building and leveraging networks. Talent is needed for all facets of building a new company and for creating new businesses and/or units in corporations. In this regard, learn how to tell the story. Chapter 5 addresses "blowing up your borders" through building multidisciplinary teams with complementary skill sets linked to internal and external networks. And Chapter 6 talks about "Being of Value, or giving before you get. While it may sound trite, understanding the needs of others, both inside and outside or your organization is an important component of establishing productive collaborative relationships and partnerships. Here is a quote worth noting; -- "We live in a time when our economy relies on startups and collaboration. I have heard so many times the only thing entrepreneurs need is financial capital. This isn't true. First, capital comes in various forms: intellectual, economic, institutional, physical, and human. Second, the entrepreneurs will need to connect with countless stakeholders to scale their idea. How often do we see people trying to do things by themselves? This can't work anymore". -- The book provides many great lessons from Brad Feld and Techstars. We will save a few of those for the Q&A session below with Mikel. This chapter provides ample evidence about tapping into the people around us and making them successful, even if they didn't ask for it.

And, in Chapter 7 we learn about "starting small, and growing big with purpose". Here is a 'teaser quote' that pretty much says it all. "In my experience, every time a project ended up being successful, it was when people

opened the challenge to anyone who wanted to participate, and got early adopters" engaged. In many cases these people were more excited about the project than anyone else. Also, use all the digital technologies of our time to impact more users and partners fasters.

At this point, I'll accelerate the pace and provide a more shallow dive to complete the book review as we move into Part Two. Part 2 of the book is titled "Seven Mindset Principles to Build, Join, or Leverage the Power of Networks.

"If you want to change the world, you will swim against the current, and it won't be easy. One of the core qualities any change-maker will need to have is resilience. You will fall on the ground many times. One of the methods to build strength is your ability to think, *with whom can I collaborate to achieve what everybody tells you can't be done?* Commercializing transformative technologies is not an easy task. In my terminology, renting parts of the value chain is a way to eventual success with a good choice of partners.

"Building networks is the power of our time. By doing what you can't, anyone can establish partnerships and overcome the odds". I couldn't write this book without talking about this essential tool for building networks, innovating, and influencing society by creating a movement: social media. "Use these digital tools for sharing your message with partners, collaborators, etc. If you want to create change globally, having an idea is not sufficient. You need to be able to scale to make an impact. Social media is an extremely powerful tool for sharing a message and attracting talent to your mission". But, I leave it to the reader to check out these parts of the book in more detail.

That brings us to Part Three of the book, and deserves a short quote from a 2020 Schwab publication: "A great example of this new model is the collaboration we've seen during the COVID-19 crisis to launch a new vaccine in a record time. "Companies, universities, and others have joined forces to develop diagnostics, therapeutics, and possible vaccines; establish testing centers; create mechanisms for tracing infections; and deliver telemedicine. Imagine what could be possible if similar concerted efforts were made in every technology sector".

Mangold concludes his book with a description of the workplace and way of life that many of us will experience: and, asks the question, what are we about to experience in the coming years? His answer used a quote from 2014 attributed to Jacob Morgan a futurist: "*Work as we know it is dead, and the only way forward is to challenge convention around how we work, how we lead, and how we build our companies.*" That pretty much sums up the essence of the book, and appropriately, we'll end the book review with a short (digital) Q&A with the author.

AUTHOR'S Q&A

Q1 – Mikel, you have really covered the importance and power of networks very well. In my review, I point out that networks and networking is one component of the "Innovators DNA" illustrated by Christensen, Gregerson, and Dyer. The other 4 components are associative thinking, questioning, observing and experimenting. What is your perspective on how to build and lead teams that have a balance of these 5 components?

Mikel: It is a very difficult question and I cannot come up with proper numbers or statistics. However, both the article and examples, in addition to all the research I did for the book support this: networking IS helpful for associative thinking.

About the skill n*1 " Dunbard discovered that for researchers, the best ideas emerged during regular lab meetings. Dozens of researchers would gather and informally present and discus their latest work. The "distributed reasoning,", or associative thinking where several scientists come together to understand and solve a problem, distinguished the successful scientists from the others. In research, innovation did not come from the microscope, but rather from the conference table"

Link to the research

About skill n*2: questioning everything. For me, again, this skill can be taught and it comes from your network. You learn to question everything if a mentor tells you to do it; if you meet other entrepreneurs doing related things; if your network questions your process, you will understand how important questioning is. So, many people I met in Silicon Valley are doing exactly that, and it's part of the culture.

About skill n*3: Observe everything: that is probably coming from you personally and others. Usually, scientists learn this skill as it's a "must-have" skill in the labs; you need to detect if anything is abnormal. The most difficult part is that your new idea coming from your observation must be accepted by others, and you can't do it without a supportive network.

About skill n*4: Experimentation; again this is all about the network; to experiment needs customers, friends, and colleagues that are willing to try, test, and provide feedback. If it is a healthcare solution; you need a network of clinics, hospitals, and physicians that will be willing to use it.

Skill n*5: Networking is therefore the foundation of the four skills above. The book highlight that your network will even become more important tomorrow due to the interdisciplinary of everything, and the acceleration of

change. Therefore, I would say networking is right now experiencing a 2x linear increase over years if not more!

Q2 – Can you comment on the formation and leadership of more formal alliances and consortia that are an essential part of innovation in today's global economy? And, give an example or two in biopharma or digital health that have been successful either recently or in the last few decades.

Mikel – I totally believe the human behavior is the drive behind successful alliances. I recently met in person Jan Berger from GE healthcare. They have built an entire business ecosystem around the company, including attracting experts, clinics, doctors etc. to help startups test, validate and scale their ideas together with GE. Who is attracting all the people and companies into the ecosystem? The people working at the firm. They are the ones convincing others to join and Jan – with his ecosystem leadership – is one of them.

Another example of a person last year is Frank Kumli; he is building the basel business ecosystem for biotech and digital health startups. He leads, promotes, lives the ecosystem mindset and spreads the "how to do" with the employee of the organization, etc. Companies and backbone organizations trying to build a business ecosystem need to selectively select their leaders, since the people within those organizations are the ones driving and closing deals. More about the success of Basel, and how they attracted companies to move or collaborate with pharma companies, refer to: https://baselarea.swiss/basel-news/

Q3 – As a follow on question, it seems to me that alliances are essential for success in the emerging industry segment of digital health. Any observations on how the IBM Watson scenario might have played out more successfully?

You're right. Any project failure is a lack of pivoting, experimentation and partnerships. Anything should be possible in today's world with the right alliances formed. I can't tell so much about IBM and what they're done wrong but a good example of successful alliances is what Google did with their NEST product. They built an open ecosystem around it. more can be read in this article: https://hbr.org/2019/09/in-the-ecosystem-economy-whats-your-strategy

Q4 – Another issue that is intriguing to me, and very relevant in today's economy is the topic of leading change. As one who works with alliances of larger organizations with emerging companies, do you have any comment or observations on Kotter's framework for leading change?

I identified a problem while I was writing this book: many frameworks and articles explain how top executives can lead a change within an organization, but those articles do not really target the "everyone" in the organization. I see Kotter's framework as a guiding tool for executives, but not really for a normal employee. In my work, I explore and suggest that in today's world; the bottom-up approach can also be very effective. The best ideas usually come from an employee at the bottom, and then that employee gets a small group around him, to convince higher-ranked individuals. The decision-maker will then agree to proceed. When the employees do the work and are proactive; the company wins. The Leaders must create this culture and hiring the right people with this mindset is essential.

I personally work at a Japanese company and I am trying to build alliances with startups and external partners. I realized that the key success factor to having the alliance is to involve many people, especially top management, in the conversation as soon as possible. People have to cook the meal with me before it can be served. Therefore, within our team, we established a process to communicate to top management. Once I found a company that is interesting, I analyze the "1. WHAT – are they doing?; the 2. WHY – are they relevant for us? and the 3. HOW – to collaborate." This comes after I analyzed them; then it goes to my boss and my boss sends it the top management who are in the US and Japan. Usually, we dig deeper after they think it can be relevant for us, and once they provided, the feedback.

Kotter's framework is great, but personally; as an employee at the bottom, I hardly see how I can use it effectively?

AAB – conclusion – I'd say that the Kotter framework is indeed useful and insightful as long as there is communication and engagement throughout the organization. That is the key where everyone is pulling in the same direction and contributing to pivots as learning progresses. Isn't this just another way of viewing collective intelligence! All contribute to the solution and are aware of the sense of urgency to innovate – or be bypassed in the marketplace, or otherwise fail! Perhaps we should save this discussion for another day.