

## The Board's Role in Innovation

Fireside Chat with Nora Denzel  
Moderated by Robert Gross

### Key Takeaways

- There is much more innovation happening today than ever before, and the speed of innovation is only going to get faster.
- Some people call the era we're in now "the second half of the chess board" based on a 17th century parable of a king who liked to play chess and an opponent who wanted to be paid in rice grains. Once the king lost, he learned while paying the victor that by doubling rice grains on each square of the chess board, starting with one grain on the first square, the second half of the chess board grows at an exponential rate.
- Essentially since the 1950s, computer processing power has doubled every 12 to 18 months, and now we're experiencing innovation at what has been called "**exponential technological advancement.**"
- The board's role is ensuring management is spending an appropriate amount of effort for short- (1-2 years), medium- (3-5 years), and long-term (5+ years) growth.
- Board members must ask themselves if they are spending so much time discussing the current business that they are missing the potential disruptive forces going on outside.
- In summary, I think Jack Welch put it best by saying *"If the rate of change outside your company is going faster than the rate of change inside your company, you may be headed for disruption."*
- **Questions directors should ask about innovation:**
  - How does this company view innovation?
  - What are we working on now that has the potential to be up to 10% of our revenue in the next three years?
  - What does disruption look like? Who are our emerging competitors?
  - How can we use technology to help us win against traditional and new competitors? Or enter new markets?
  - What are the outside forces that could, or are now, affecting our business? What are we doing about them?
  - How does this company measure innovation?
  - How do we treat failure? (Remember, most new innovation fails. The culture has to be very forgiving or people won't try, and you could miss a big shift because employees fear losing their job if they fail.)

- How are we including the right outsiders in our innovation thinking (for example, Venture Capitalists, start-ups, other partners, academia, others)?
- One last point, innovation doesn't necessarily mean R&D. Companies can also innovate in the business model, on existing product packaging or partnerships. All departments must be thinking about how innovation can help reduce cost or increase revenue.

## Types of Innovation to Consider

### 1. Quantum Computing (estimated to be ~10 to 20 years away)

- This is a new, vastly different way of creating computers.
- In a nutshell, today's computers work by manipulating something called "bits" that exist in one of just two possible states: 0 or 1. But quantum computers aren't limited to just two states; they are able to have their version of bits called "qbits" be in **multiple states simultaneously**.
- Although quantum computing has the potential to be millions of times more powerful than today's most powerful supercomputers, all software would have to be rewritten to take advantage of this new architecture, which will take many years.
- CalTech estimates it'll be at least 10 to 20 years before we'll see quantum computing commercialized. It won't be mainstream for a very long time, if ever. It will mostly be relegated to certain types of computing in very special environments.
- Today, this technology is largely being invented and tested by governments, large research laboratories, and other highly scientific environments.
- **Additional resources:**
  - A good *Newsweek* article on quantum computing: (<http://www.newsweek.com/2017/04/21/quantum-computing-ibm-580751.html>)
  - An explanatory article from HowStuffWorks quantum computers: (<https://computer.howstuffworks.com/quantum-computer1.htm>)
- **Questions directors should ask about quantum computing:**
  - At this time, I do not think a director should be asking management teams about quantum computing (unless the company is somehow related to this area).

### 2. Blockchain (estimated to start affecting selected industries in 3 to 5 years)

- Blockchain is not Bitcoin. It is **the technology that enables Bitcoin** today, but it's so versatile that it will enable many other types of applications in the future.
- What started as a research paper in 2008 when the financial crisis hit is now being used to enable over 1,000 cryptocurrencies, including Bitcoin.
- Blockchain is a very disruptive technology—especially to companies that sit in the middle of transactions. Think about buying a house without an

- escrow company, buying music directly from an artist without having to use iTunes, selling your excess solar energy directly to another consumer without going through a power company, and many other things.
- Blockchain can also enable an emerging concept called “smart contracts.” Smart contracts are the automation of contract enforcement.
  - **Additional resources:**
    - This is a great 18-minute TEDx talk by Alex Tapscott, coauthor of the book *Blockchain Revolution*. He discusses how software is “eating” Wall Street. I think it’s one of the best explanations of Bitcoin and blockchain today. (<https://www.youtube.com/watch?v=WnEYakUxsHU>)
    - In this TEDx talk by Charles Hoskinson—a mathematician with a gift of simplifying things—you’ll learn about smart contracts, decentralized applications, and what industries can be disrupted. (<https://www.youtube.com/watch?v=97ufCT6lQcY>)
    - This 13-minute video is for those who really want to understand deeply how Blockchain works. It’s from Shai Rubin, chief technology officer at Citi. ([https://www.youtube.com/watch?v=93E\\_GzvpMA0](https://www.youtube.com/watch?v=93E_GzvpMA0))
  - **Questions directors should ask about blockchain:**
    - Do we include blockchain in our larger board discussions around business strategy?
    - How can this technology create new opportunities or efficiencies for our company?
    - What are the possible risks, such as disintermediation or unforeseen competition, that blockchain can pose to our business model?
    - Where should oversight of this and other emerging technologies be housed: at the full-board or committee level? (Note: Some boards are creating non-statutory committees to vet disruptive technologies. The committees will dive deeper into what’s on the horizon as they will have more time for the topic than the full board will.)
    - How have we explored partnerships or acquisitions that would better equip our company to handle the potential impact of blockchain technology on our business?
    - What skills and technology capabilities do we need to acquire to exploit the benefits of blockchain?

### **3. Internet of Things (IOT; parts of this are already here, and it’s expected to keep coming for at least a decade, if not more)**

- IOT is the interconnection through the Internet of computing devices embedded in everyday objects. People talk about two IOTs: one for consumers (think of a Fitbit, a connected car, or a printer that automatically orders its own toner); and the other is called the industrial Internet of things, or IIOT, where factories are connected throughout and

to each other to make ordering new parts easier, to sense and respond to how their products are being used, and many other things.

- The IOT/IIOT movement has already started. Sensors that collect data are in almost everything we buy today: bicycles, some toothbrushes, refrigerators, printers, some band aids, some clothing, some yoga mats, and millions more things.
- These sensors will create massive amounts of data that, when used appropriately, can provide a competitive advantage to companies.
- **Questions directors should ask about IOT/IIOT:**
  - How do we see IOT/IIOT affecting our company?
  - How do we keep the data we have today and will collect tomorrow safe?
  - How are we using data to create customer delight now and in the future?
  - How are we using data now and in the future to make better decisions in our company and optimize our operations?
  - Do we have the right skills in our company to take advantage of the changes from IOT/IIOT?
  - How could we become disrupted by IOT companies?
- **Additional resources:**
  - A good primer by *Forbes* on IOT (<https://www.forbes.com/sites/jacobmorgan/2014/05/13/simple-explanation-internet-things-that-anyone-can-understand/#6932b8b91d09>)
  - An introductory Tedx talk by Benson Hougland that is loaded with a lot of examples of IOT, especially for consumers ([https://www.youtube.com/watch?v=\\_AlcRoqS65E](https://www.youtube.com/watch?v=_AlcRoqS65E))

#### 4. **Artificial Intelligence** (it's been talked about since the 1950s, and it's accelerating now and will continue to do so in the future)

- Artificial intelligence (AI) is the big category that includes “machine learning,” “deep learning,” and other subcategories. It's a broad term from which therewith are many sub-terms.
- Two of the more popular terms you'll hear are:
  - **Artificial intelligence**—Intelligence displayed by machines. Prior to AI, people usually talked about “natural intelligence” or intelligence displayed by humans. A common example of AI is Siri, the iPhone voice-recognition software or Amazon's Alexa.
  - **Machine learning**—Technology that provides computers with the ability to learn without being explicitly programmed by humans. Machine learning focuses on the development of computer programs that can change when exposed to new data. An example is IBM's Watson: software that can make recommendations on how to treat certain cancers based on reading and comprehending all available content on the subject. The recommendations Watson makes will vary based on new data it receives because Watson's algorithms will change themselves based on learning what treatments are effective and which are not.

- AI is a very hot topic right now because technology has become so advanced that AI projects can be created at a lightening pace. Networks are faster and can have more data, special computer chips can process the tsunami of data at lightning speed, and storage devices can now hold 1,000x more data than in the 1950s.
- Think of AI broadly as automation: automation based on collected data that can make your company more efficient, be able to sell more interesting products to its customers, provide better and more personalized customer service, along with many other things.
- **Questions directors should ask about AI:**
  - How could our customer service and total customer experience benefit from AI?
  - How are our competitors using AI in new ways to compete more effectively?
  - How could AI help us improve our operations or grow faster?
  - Are we using AI in our operations now? If not, why not?
  - How will we get the skills needed in AI to compete in the future?
- **Additional resources:**
  - Computerworld article that details AI (<https://www.computerworld.com/article/2906336/emerging-technology/what-is-artificial-intelligence.html>)
  - *Harvard Business Review* article on AI (<https://hbr.org/cover-story/2017/07/the-business-of-artificial-intelligence>)

## 5. **Virtual and Augmented Reality** (estimated to be at a bigger scale at the later end of 3 to 5 years)

- **Virtual reality (VR)** is also called “deep immersion.” It means having a person wear a headset (or some type of head gear) that can take them virtually away to another location. The feeling the person gets is so real, it will feel as if he or she is really there. For example, the NBA is experimenting with VR that will allow you “be at” the Utah Jazz game from your own home without going to the stadium. Just by wearing a headset on your couch at home, you could look around and see different views of the game through VR.
- **Augmented reality (AR)** doesn’t require a full headset; it can be used by holding up your phone toward something you want to augment. For example, if you are in Rome, Italy wondering how the Roman Coliseum looked before it decayed, you could hold up your phone toward it and all the missing pieces of the Coliseum would be placed back in the right spot. AR would allow you to look back into time to how things were, versus how they are today.
- VR is struggling today to find its niche beyond computer gaming. Since Facebook’s purchase of VR headset maker Oculus, we haven’t seen the technology make many big breakthroughs into the mainstream, outside of Hollywood and gaming. However, most people haven’t written it off yet.
- AR seems to have more promise. It could be used to more quickly train employees, help us pick out new kitchen appliances by having them “placed” in our existing kitchen when looking through the screen on your

phone, or transform the way we try on clothes in a store by showing us exactly how the clothes would fit us without us having to physically put them on.

- **Questions directors should ask about AR/VR:**
  - How do you think AR and VR could impact our company's products or services in the future?
  - Do we have the right technical talent in our company to execute strategies or investigate the potential of AR/VR?
  - What are our competitors doing with AR and VR?
  - Can we use AR and VR to improve our business processes, such as logistics, maintenance, and marketing, or to enhance employee training and experiences?
  - Who are we working with outside the company to accelerate our learning in AR and VR?
- **Additional resources:**
  - Helpful summary article on a board-level view of AR and VR by PwC (<https://www.pwc.dk/da/publikationer/2017/essential-emerging-technologies-augmented-and-virtual-reality.pdf>)

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