Strategy Essentials

Engineers Can Be Change Agents

Jerry Buckwalter

September 2022

Thinking About the Future

Focus on What's Not Going to Change

"I frequently get the question: 'What's going to change in the next 10 years?' … I almost never get the question: 'What's not going to change in the next 10 years?' And I submit to you that that second question is actually the more important of the two — because you can build a strategy around the things that are stable in time. … [I]n our retail business, we know that customers want low prices, and I know that's going to be true 10 years from now. They want fast delivery; they want vast selection. It's impossible to imagine a future 10 years from now where a customer comes up and says, 'Jeff I love Amazon; I just wish the prices were a little higher,' [or] 'I love Amazon; I just wish you'd deliver a little more slowly.' Impossible. And so the effort we put into those things, spinning those things up, we know the energy we put into it today will still be paying off dividends for our customers 10 years from now. When you have something that you know is true, even over the long term, you can afford to put a lot of energy into it."

Jeff Bezos
Founder & CEO of Amazon

The type of outcomes that users desire rarely changes, what changes are:

- The manner in which the desired outcomes are generated
- The quality of the outcomes that are generated
- The costs incurred to generate these outcomes

Look for the "Obvious"

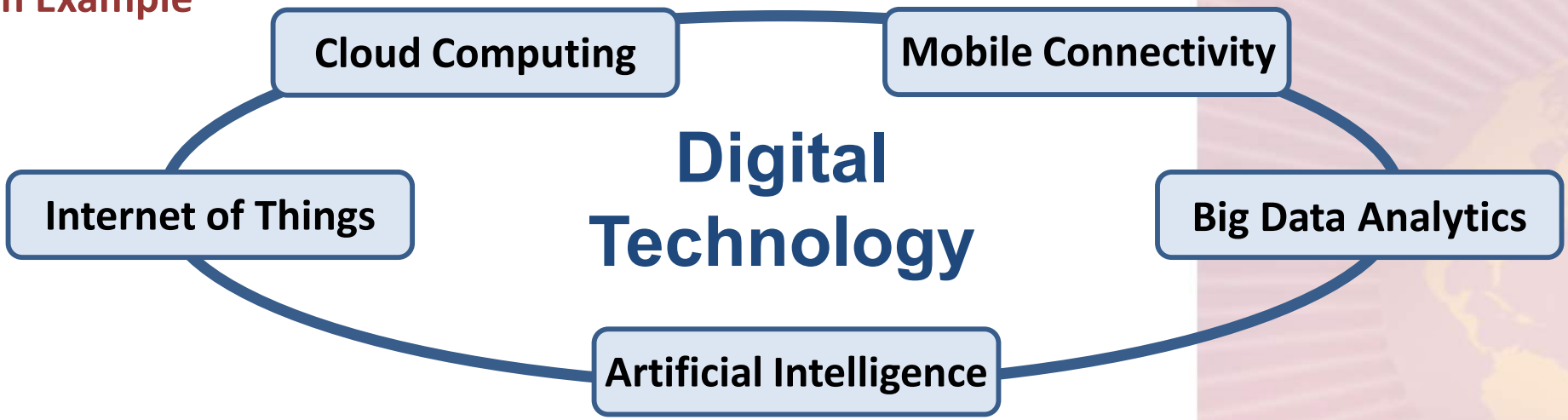
Three primary ingredients to "obvious" change:

- **Visibility:** There's a clear roadmap to the technology achieving threshold performance requirements in specific value creation domains
- **Minimal Adoption Tradeoffs:** Application of technology implies minimal or no tradeoffs for customers/users – they are simply "better off" with the new technology or solution
- **Market Pull:** Business opportunities will drive the investments necessary to overcome market development inhibitors (including ecosystem challenges)

Reed Hastings
Co-founder, Chairman and CEO of Netflix

Focus on Multi-Faceted Reinforcing Trends

An Example



1. What is the change to traditional engineering services represented by digital engineering, autonomous engineering or data-based services?
2. What's the long-term impact of new types of services and service delivery on the engineering profession and industry?
3. What should be the leading companies' best approach to expand into these new services?

Industries Start to Think About The Digital Impact

Aviation Week article
March 2019
Tom Enders, CEO, Airbus

Key challenges over 25 years will cause fundamental changes for future aerospace

- The world will experience ***unprecedented technology changes*** (e.g., digitalization, AI, robotics, biotech) and aerospace's ability to utilize this data will be at least as important as propulsion or aerodynamics
- Aerospace companies (who will never be expert at AI) must rapidly forge ***smart partnerships*** with different and powerful new global technology players and competitors and ***transcend geopolitical boundaries*** that divide our industry
- Aerospace businesses are complex and bureaucratic – we need ***flatter and more flexible organizations*** unleashing the creativity of people via open ***innovation platforms and empowered teams***
- Governments must strengthen their strategic capabilities, recognizing that aeronautics and symbiotic technologies contribute to Europe's geo-political autonomy, and develop a full-fledged ***industrial strategy***
- Governments will be increasingly unable to cope with the speed of change – industry leaders will have to get out in front and make ***bold, proactive decisions***

Industries Start to Think About The Digital Impact

Strategy+Business article
February 2019
Hernan Rincon, CEO, Avianca

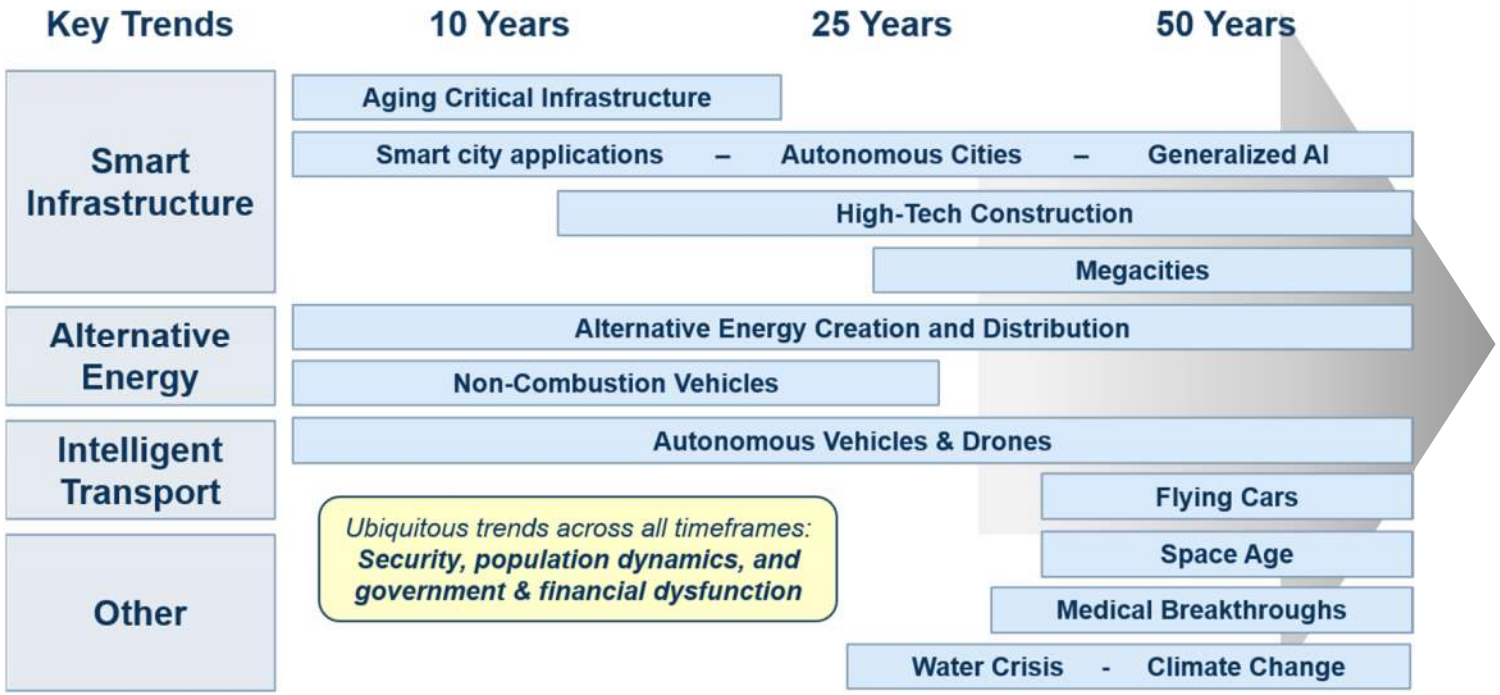
The World's Second-Oldest Airline Prepares for a Digital Takeoff

- ***Transform*** the airline ***into a digital company*** that flies airplanes
  - Map every point of customer interaction, and apply technology each one of them to make it more efficient and agile
  - Transform productivity with internal digitization, working with data lakes to break down compartmentalized information
  - Implement digital currency – airlines miles are a block chain application
  - Create a digital culture, using millennials to help the whole organization transition quickly to the digital world
- Build ***market share through partnerships and strategic global alliances***
- Focus on ***full customer service***, but with options, to avoid high prices
- Focus on ***innovation*** facilitation with centralized tools, experience and knowledge of best practices to help all areas of the company innovate for themselves on a federated basis
- Attract the right ***talent***, offer competitive compensation and revolutionize work conditions/arrangements

An Example for AEC

ASCE's Future World Vision (FWV) Project

Trends Analyzed



Future Scenarios

- Determine how changing societal trends will affect future infrastructure
  - Emerging trends create significant shifts
  - Shifts are difficult for engineers to anticipate – and react to
- Examine 6 key future trends, identify key drivers and uncertainties, determine the impacts for engineers and understand how these trends converge into different global scenarios

Statement of Urgency

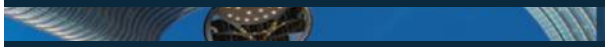
Change is coming, and it's **on a scale** that can drive confusion and dysfunction unless cities, industries, organizations, and individuals are **prepared to tackle new realities**

Alternative Energy

Autonomous Vehicles

Climate Change

Smart Cities



High-Tech Construction / Advanced Materials

Policy & Funding

Analysis Process

	Year 10	Year 25	Year 50
Drivers / Trends			
Uncertainties			
Forecast Outcomes			

Resulting Needs and the Realities of the Future Built Environment

Resulting Engineering Roles and Partnerships

Resulting Engineering Capabilities and Skill Sets Required

Engineering Transformational Imperatives

- Prepare for resilience for extreme environments and anticipate changes in demographics and urbanization
- Incorporate advances in materials, computing power, technologies and engineering/ construction processes
- Embrace digital models and big data use, including digital security, intelligent systems, autonomy and virtual reality
- Understand system dynamics and nature of systems integration
- Increase pace of innovation and lead in change, risk management and ethics
- Create alignment and collaboration with varied engineering disciplines and non-engineering partners for non-traditional projects
- Attract new talent, continuously train and grow careers

The Future World Vision Platform

An Immersive Storytelling Experience

Combines the power of a 4D environment with a powerful narrative to immerse users inside 5 interactive scenarios

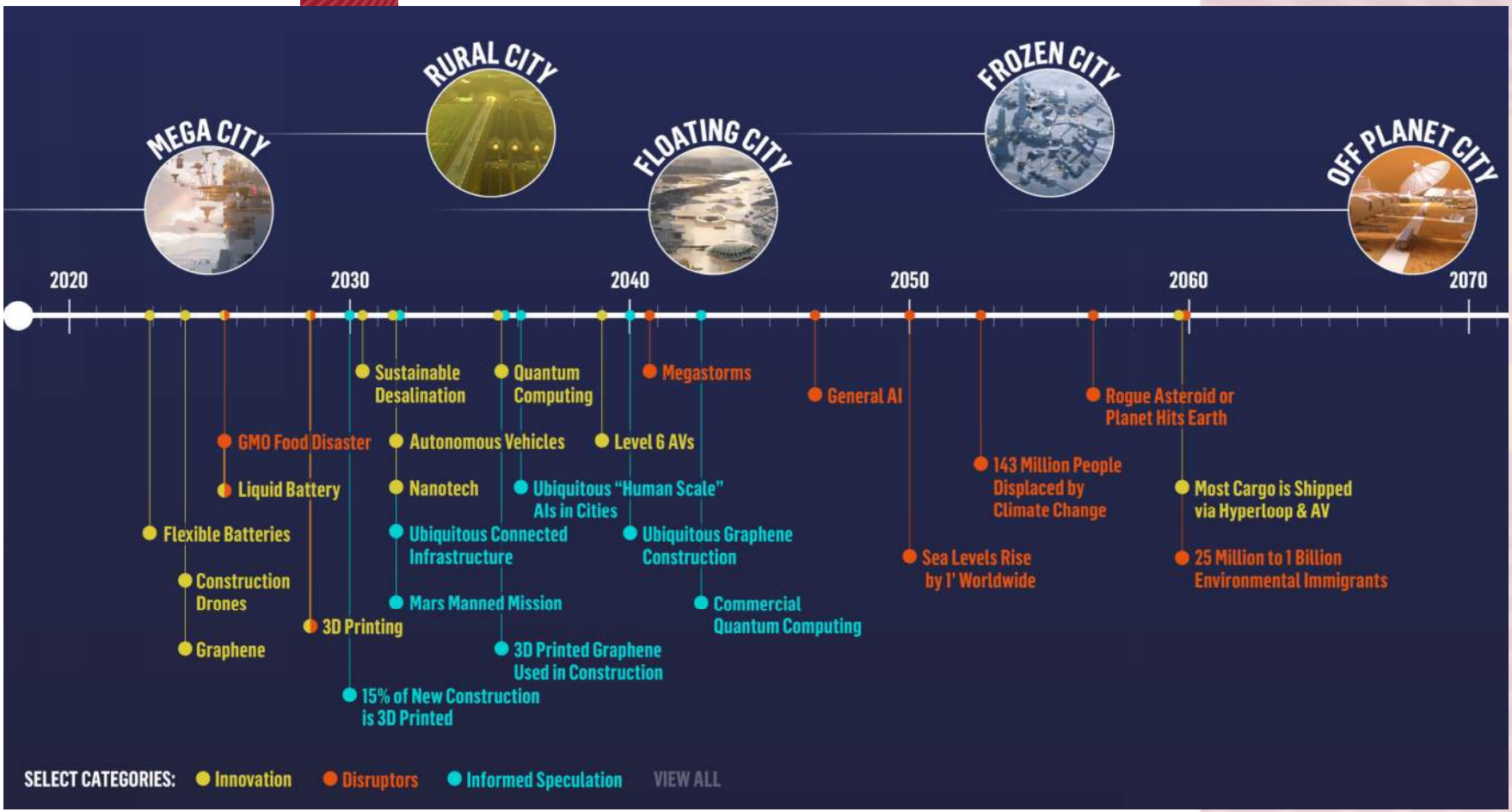
Narratives at the Macro- and Micro-Scale

Experience the future city at both the human-centric street view and the systems-based infrastructure macro view

5 Fully Developed Future Worlds

Explore pressing issues that engineers face today and will face in the next 50 years: **Mega City, Floating City, Rural City, Frozen City and Off-Planet City**

Five Future Worlds



Future World Vision: An Opportunity to:

Explore

Explore pathways through complex infrastructure of a future world from your computer and discover the potential impacts of converging trends on society

Engage

Engage in a collaborative workspace with people from around the world, to explore smart cities of the future that are resilient in a variety of climates, cultures and political landscapes

Challenge

Compete with others in an online environment for recognition of your team's innovative solutions to today's, and the future's, most pressing engineering problems


ASCE
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FUTURE
WORLD
Infrastructure
Reimagined
VISION

The Role of Innovation

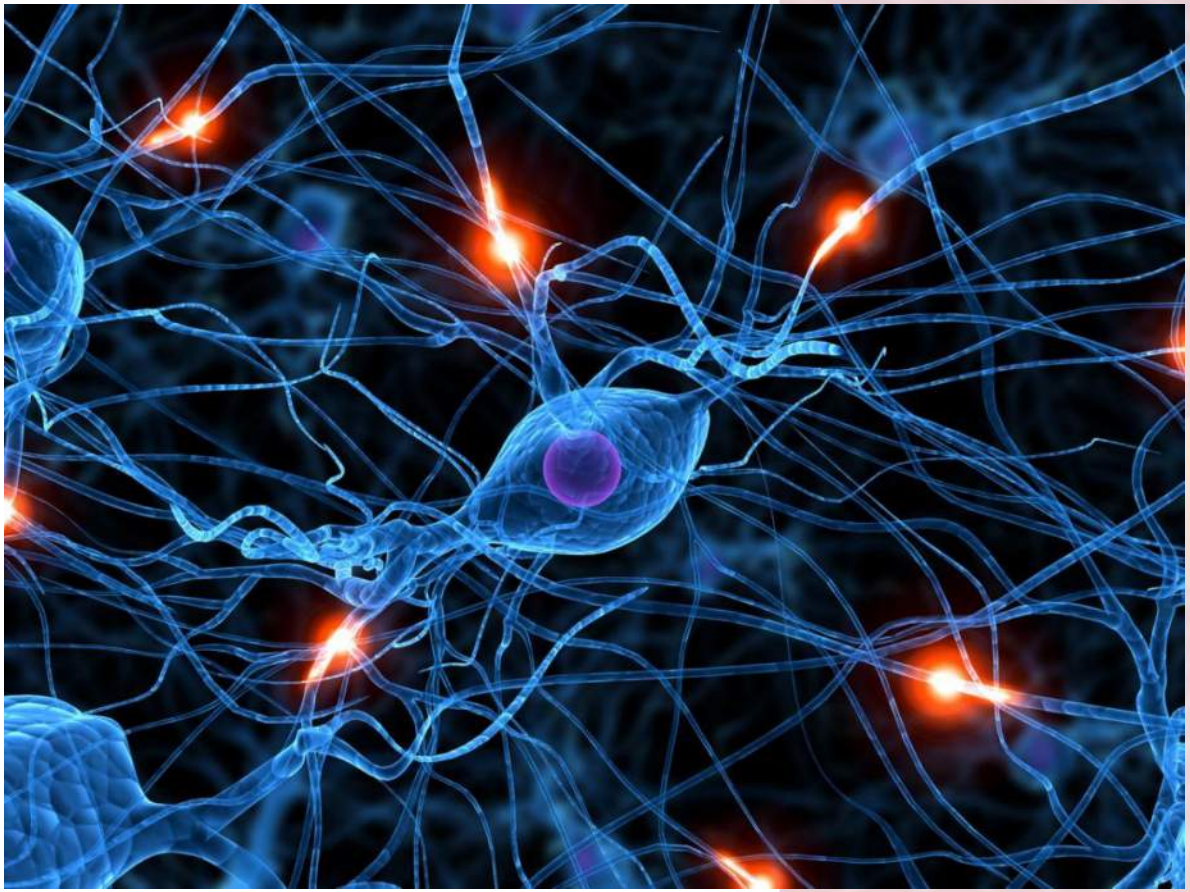
Innovation Myths

- **Random**
- **Must be a creative genius**
- **A moment of brilliance**
- **Technology only**
- **Requires big bets**

Harvard Business Review, Ten Innovation Myths, October 21, 2011

Innovation Connections

Neurons follow pathways determined by previous thought, unless forced to consider something new – then it searches for a new path



Enabling Innovation

Set the right **Culture and Language**

Set the right **Environment**

Set the right **Structure and Process**

Focus on Underlying "Need"

Design around the "job," not capabilities

"If you want to continuously revitalize the service that you offer to your customers, you cannot stop at what you are good at. You have to ask what your customers need and want, and then, no matter how hard it is, you better get good at those things."

–Jeff Bezos, CEO, Amazon

Innovators Create Through Mosaic Thinking

Seeing connections between seemingly unrelated ideas

Steve Jobs, CEO Apple Inc.

"Creativity is connecting things.

When you ask creative people how they did something, they feel a little guilty because they didn't really do it,
they just saw something.

That's because they were able to connect experiences they've had and synthesize new things."

The Engineering Balancing Act

Engineering Innovation – Balancing:

Solution Benefit Cost / Effort Safety Stability

The Role of Strategy

And How It Creates Future Value

What is Strategy?

- **Strategy is about increasing your odds of success, not guaranteeing it**

  There is no perfect strategy

- **A strategic plan combines rigor and creativity**

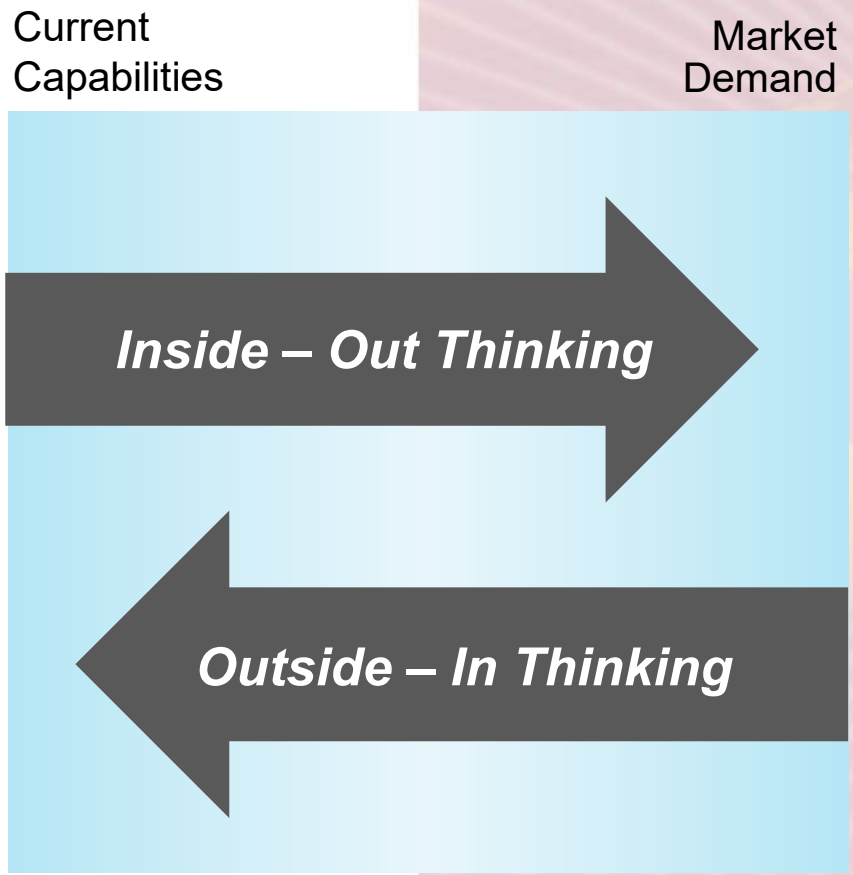
  Strategy should be creative and scientific at the same time – it involves generating and testing hypotheses

- **Strategy is about making choices**

  To achieve the goal, you must choose to do some things and not others

Understand the Value of Your Offering

- **We like to think we succeed based on our capabilities …**
- **But we don't …**
- **We succeed based on generating outcomes our target customer needs**



Elements of Value Creation

New Value Creation Idea

Unmet Need
The recognition of a need not currently met in the market. Or, an idea for creating some new form of value in the market

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Solution
The way in which the unmet need will be met or new value created through the application and integration of new and existing technologies/capabilities

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Business Model
An economic formula for generating profits through the sale of the selected solution to customers with the unmet need

Three Strategic Thinking Competencies

Outcome-Based Innovation Mindset

First focus on most important outcomes that need to be generated for the customer, then focus on how to generate those outcomes

System Thinking

Understand the "system" by examining the linkages and interactions between the components that define the system

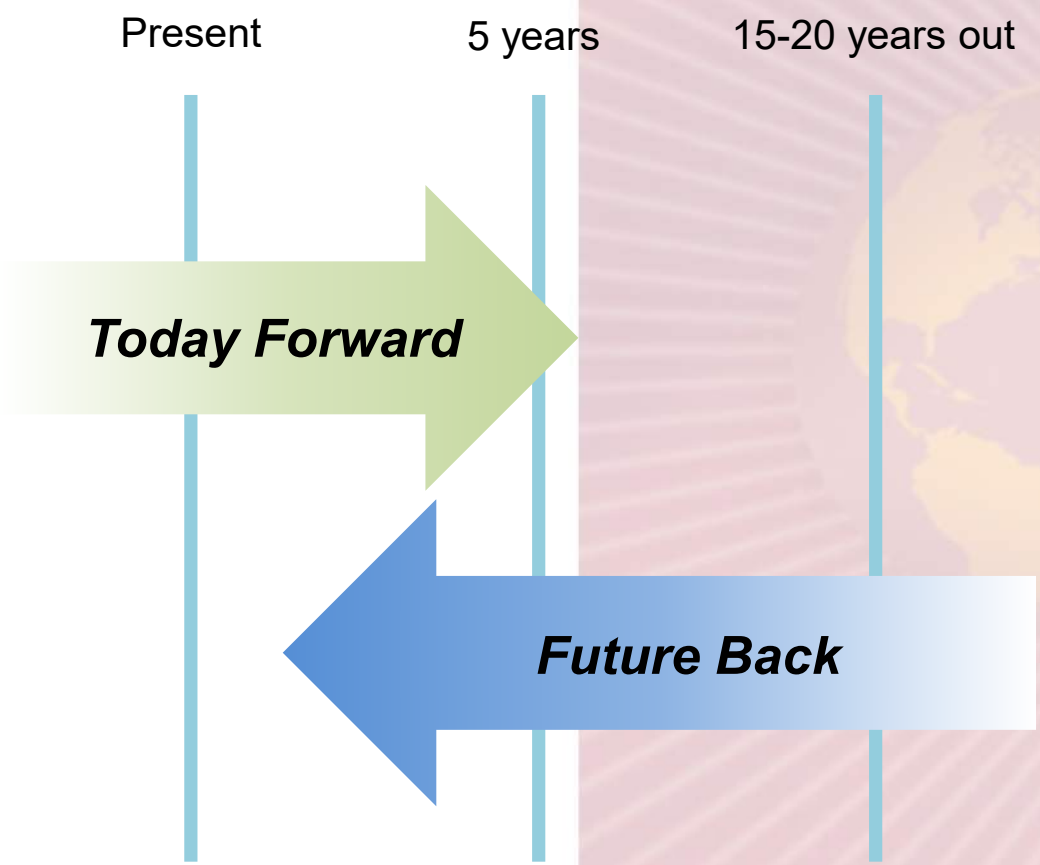
Future-Based Perspective

Focus strategic actions based on clearly articulated assumptions about future uncertain scenario construct

Challenge Yourself as You Think About the Future

Create the Future You Want

- **Significant trends and their implications**
- **Technologies**
- **Products and services**
- **Customers and markets**
- **Potential transformational or disruptive innovations**



Be Willing to Accept Potential Disruptive Change

- At the end of the 19th century, policymakers in London were looking at population trends and were concerned about the rising levels of horse manure in the streets
- At the time manure could be inches deep, but if trends continued, by 1910 it would be ankle deep, and by 1925 London would be knee deep in dung
- This didn't happen. Once the car appeared, all forecasts based on horse drawn transportation were not slightly wrong, they were ridiculous
- At the time, the automobile was hailed as an environmental savior

Sounds like our conversation about highway funding, instead of autonomous transportation or flying cars

One person's disruption story can be another person's growth story

Be an Agent of Change

Why We Resist Change

- Like routine
- Unconvincing rationale or need
- Confusing / loss of control
- Stress on people / may require new skills
- Indictment of previous performance
- We're engineers

How You Master Change

- Embrace speed, agility, responsiveness
- Adapt to virtual and flexible organization
- Listen, be empathetic, manage skeptics, communicate and develop participation
- Target results and reinvent advantage
- Tolerate ambiguity

Change is Common and Continuous

An Example of Change and Adoption Resistance

Steam Powered Factories

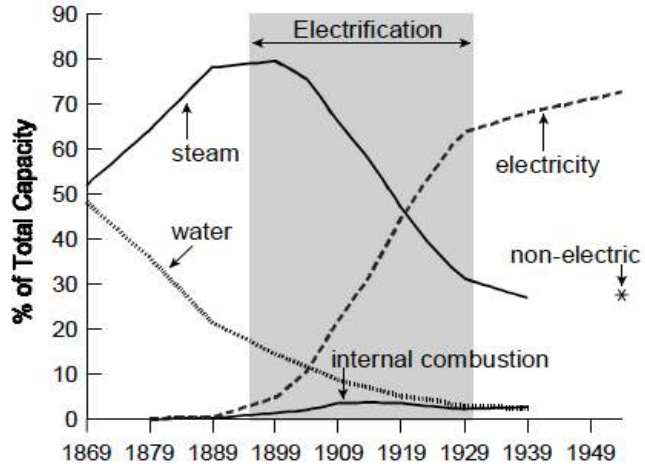


Figure 2: Shares of total horsepower generated by the main sources in U.S. manufacturing, 1869-1954.

Example provided in *The New Machine Age,* by Erik Brynjolfsson and Andrew McAfee. Original research: "Computer and Dynamo: The Modern Productivity Paradox in a Not-Too-Distant Mirror. By Paul David, 1989

- When electric motor technology emerged, engineers simply bought the largest electric motors and swapped them for the steam engines. Even new factories followed the old steam-based factory configuration.
- Only after thirty years, did factory layouts change – the distribution of electric motors was based on the natural workflow of materials/assembly.

A Favorite Guidepost

Report to Shareholders:

- What normally happens to every business: Stasis, followed by irrelevance, followed by painful decline, followed by death
- How do you fend that off:
  - True customer obsession
  - Embrace external trends
  - Resist proxies
  - High velocity decision making

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Thanks

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