

2035 Vision: Investing in the Future

July 18, 2016

2035 Vision: Investing in the Future

Today's Objective

- Engage in an educational dialogue on very long-term considerations: *how will we invest in the year 2035?*

Key Topics

- Current state
- Future state – Panelist presentations
 - *Emerging financial technologies impact on investing*
 - *Impact of "Big Data" and long-term risk factors*
 - *Perennial importance of Governance*
- Panelist and Board Dialogue on key questions

Current State | Market Environment



- **Liquidity and Income:** Increasing challenge to manage risk and pay benefits in all market conditions
- **7.5% Return Target:** Very challenging in low interest rate environment
- **Cash-flow Gap:** Increasing annual cash shortfall = increasing vulnerability to market downturns
- **Unique Operating Environment:** Investment and Actuarial Divisions operating inside a Public Agency
- **Cost and Transparency:** Continual focus

Current State | Business Model



- **\$295B Portfolio:** Stocks, bonds, real estate, private equity, and other public and private investment vehicles
- Public Assets **internally managed**, private assets **externally managed**
- Risk is a key driver of portfolio and organization
- Asset Allocation decisions made in collaboration with actuaries/ liabilities
- High degree of oversight and transparency

Current State | Talent Management



378 Investment Office Staff

- Positions are demanding and competitive; but can have reasonable hours/ balance/ compensation

Singular location

- Sacramento, CA
- No satellite offices, no telecommuting, no remote staff

Current State | Technology

Multiple leading-edge platforms/ systems consistent with mid-size Asset Manager

- Charles River (CRIMS) – Equity portfolio management
- BlackRock Aladdin – Fixed income, derivatives
- Private Equity Accounting and Reporting Solution (PEARS)
- Automated Real Estate Investment System (AREIS)
- Artemis – Asset Allocation and Transition Software
- State Street Bank - Custody/Portfolio Accounting/Performance



2035 Vision: Investing in the Future



Jesse McWaters

*Project Lead – Disruptive Innovation in Financial Services
World Economic Forum*

- Leads the World Economic Forum's work on innovation in financial services
 - Initiative that seeks to understand how new technologies and innovative new entrants are transforming the competitive dynamics of the industry
- Manages two of the Forum's Global Agenda Councils
 - Focus on Insurance and Asset Management and the Global financial system
- Contributed to the organization's work efforts that explore sources of macroeconomic instability
 - Co-authored "Euro, Dollar, Yuan Uncertainties - Scenarios on the Future of the International Monetary System"
- Former financial services consultant with Deloitte
 - Served as Head of Research for Deloitte's Future of Canada Institute



The Future of Financial Services

How disruptive innovations are reshaping the way financial services are structured, provisioned and consumed

Prepared in collaboration with Deloitte

In 2014...

BANKS vs. FINTECH?

ANNUAL MEETING 2014

NO CONTEST, BANKS WIN

In 2015...

WALL STREET'S SCRAMBLING TO CATCH UP WITH SILICON VALLEY

Lending Club rapid expansion plans undimmed

Peer-to-Peer Lending Takes Off in China

'Robo' Advice Strikes a Chord With Consumers: Study

Disruption on Deck for Retail Financial Services

Beyond Bitcoin: How The Blockchain Could Disrupt Our Financial System

The London Fintech Boom — TransferWise And Others Hit Record Numbers

APPLE PAY RECRUITS DOZENS OF NEW BANKS AND STORES

Human wealth advisers are going out of fashion

TECH UPENDED BANKS AND STOCK TRADING. INSURANCE IS NEXT

Masters joins cryptocurrency start-up

In 2016...

UBS CIO: Blockchain Technology Can
Massively Simplify Banking

The fintech revolution

Goldman joins online lenders' club

**Industry Convergence In Financial Services Is
Accelerating**

Equity crowdfunding thrives despite high
risks

**Wall Street giving billions
to fintech start-ups**

Can Fintech Fix Financial Services?

Crowdfunders seek revisions to FCA rules

Over the last three years the World Economic Forum has been deeply engaged with the drivers of the fintech revolution

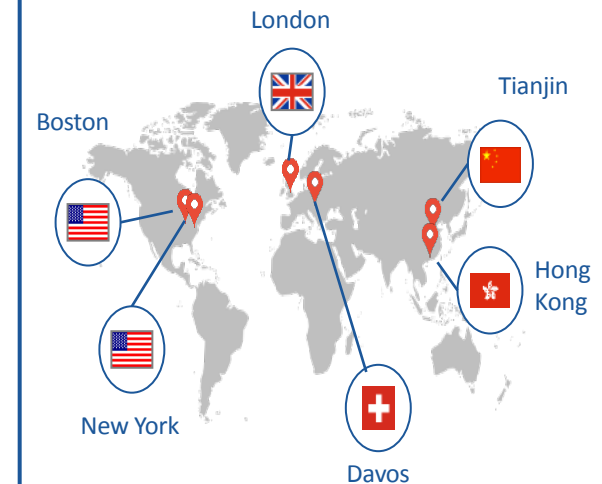
Industry Incumbents



Leading Innovators



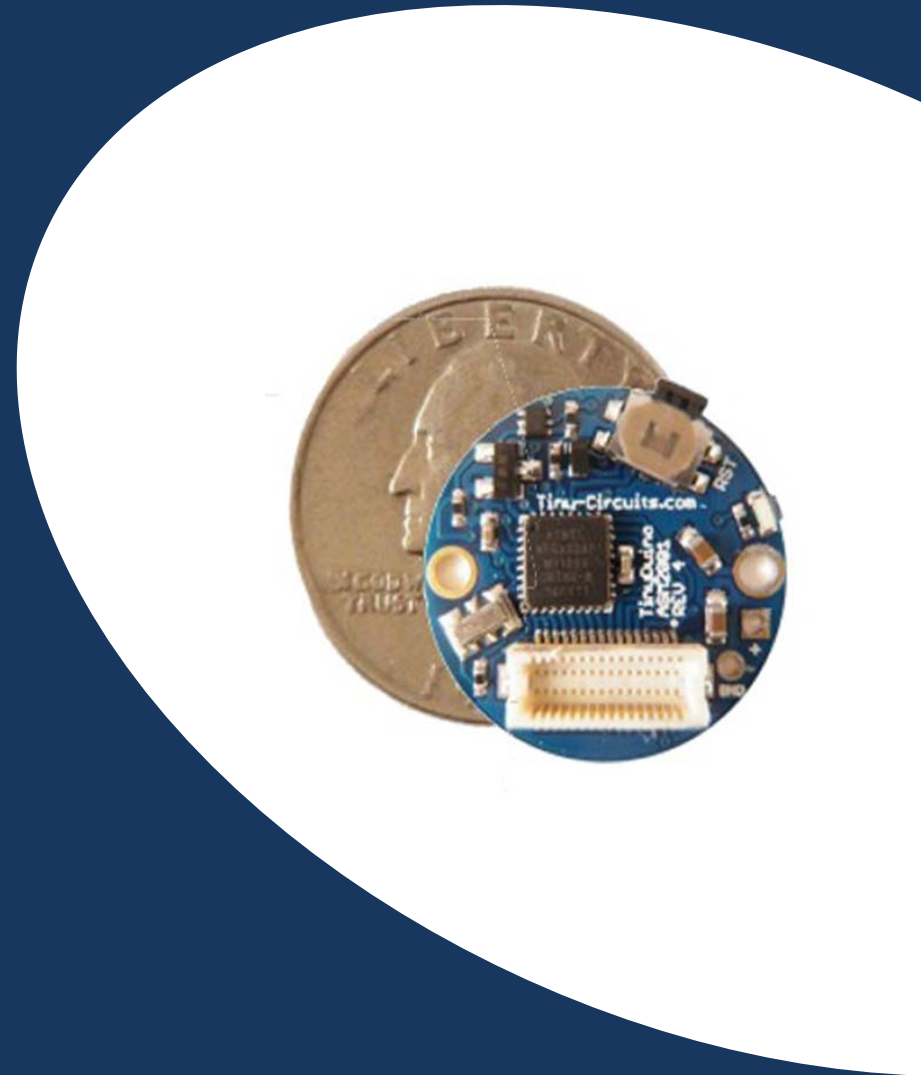
Global Workshops



We have developed a consolidated framework for disruptive innovation in financial services

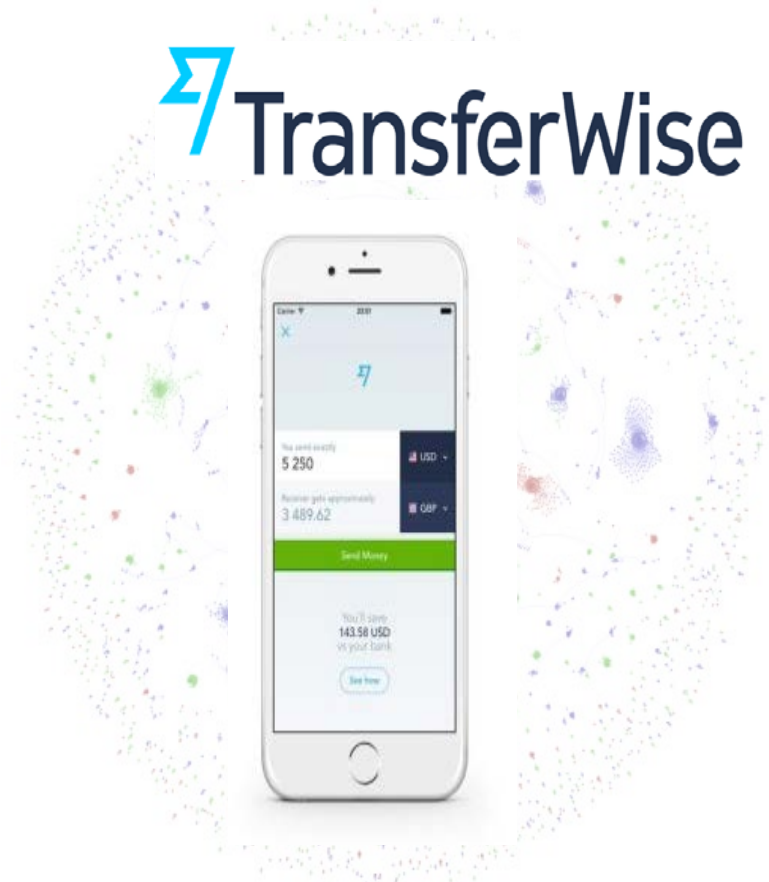


Fintech Today: Four Observations



Innovation in financial services is deliberate and predictable...

...it occurs where customer
friction
meets large profit pools



Fintech is having the greatest impact where business models are...

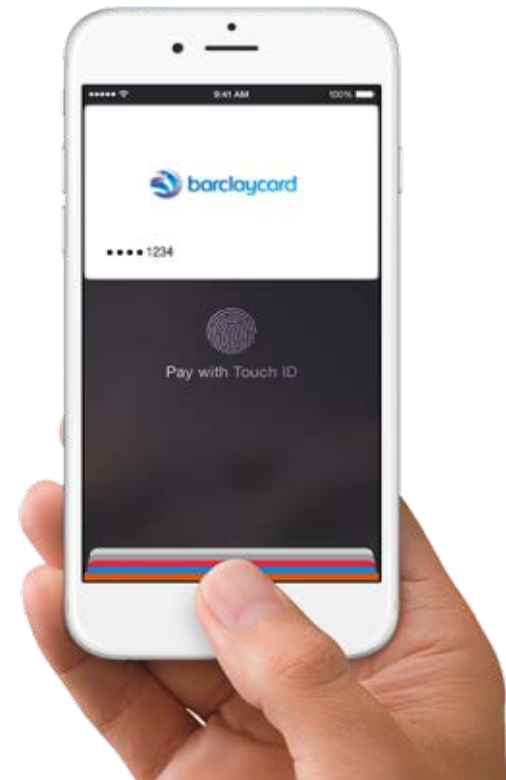


...platform based, data intensive & capital light



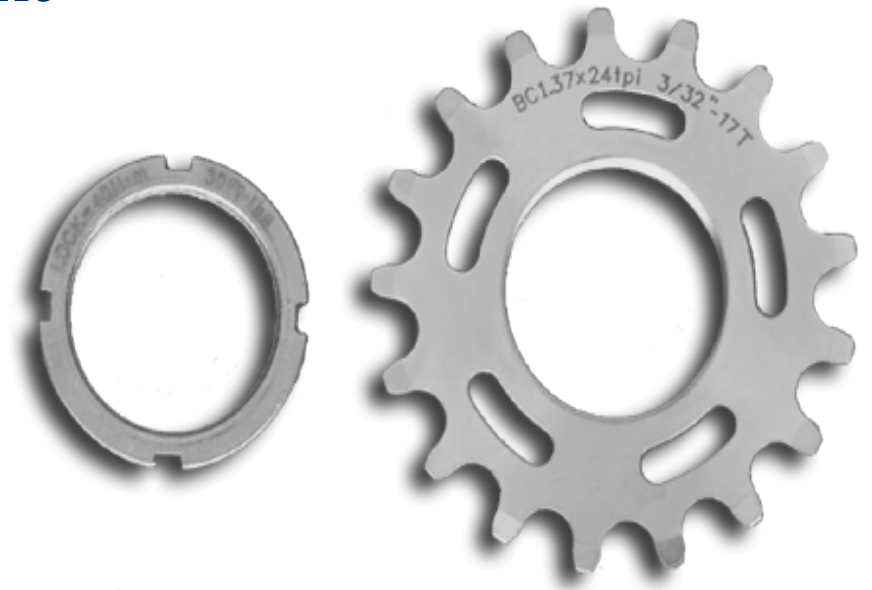
New entrants are employing parallel strategies, competing with incumbents...

... while also leveraging their infrastructure



The complementary capabilities of new entrants and incumbents make partnerships logical...

...but also difficult implement



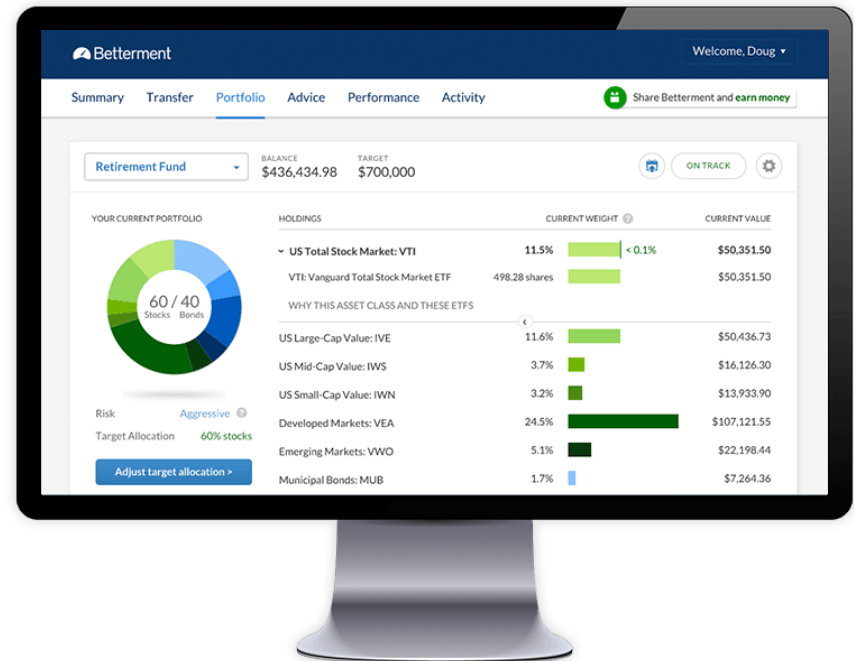
Investing in the year 2035

Early signs of change



Shifting customer preferences will drive more self-directed financial management...

...changing the role of wealth advisors



Retail investors will have access to a radically increased set of capabilities ...

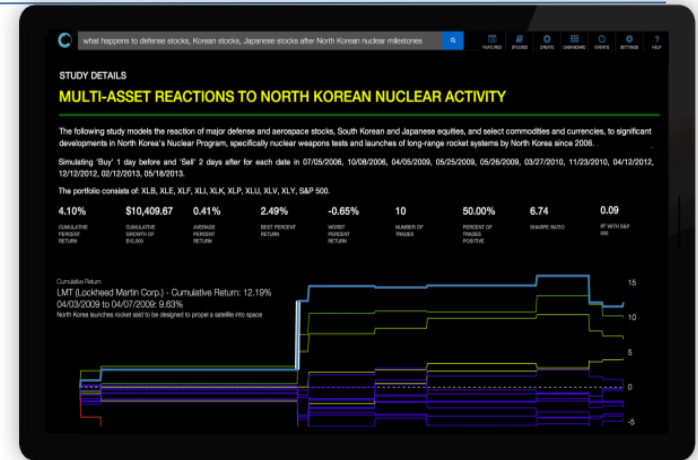
...accelerating the tempo at which active strategies emerge and are commoditized



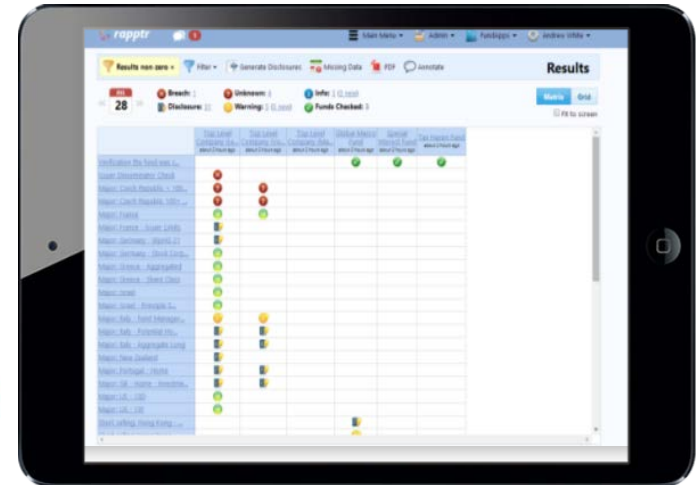
Not all Fintech innovations are customer facing...

...fintech is also delivering new capabilities and unexpected efficiencies

KENSHO



FUNDAPPS



Investing in the year 2035

The Rise of the Machines



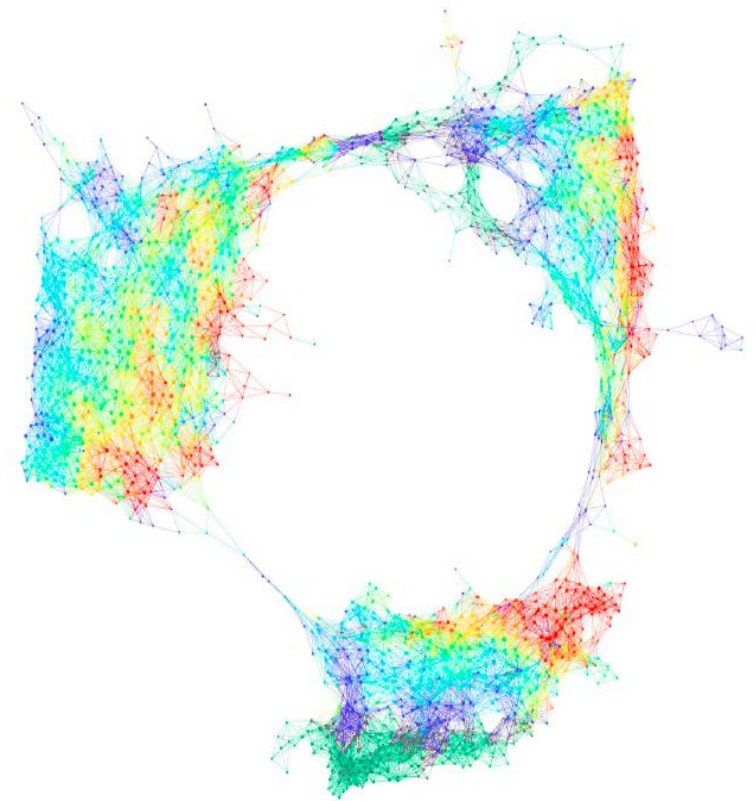
Process automation and new information platforms...

...will erode the benefits of scale
in many aspects of financial
services



The acceleration of machine learning and artificial intelligence...

...will automate unexpected processes with transformative effects



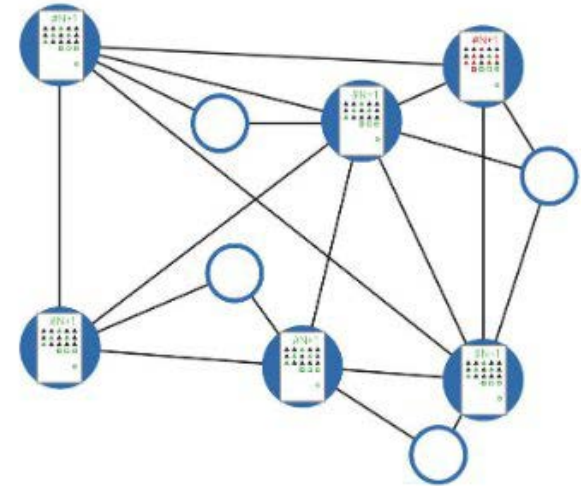
The expanded role of machines intelligence in financial services will transform the role of humans...

**...but not always in the ways that
we might expect**



Investing in the year 2035

Blockchain Revolution



Distributed ledgers like blockchain are built on complex mathematics, cryptography and game theory ...

...but the
technology is best
thought of as a set
of capabilities



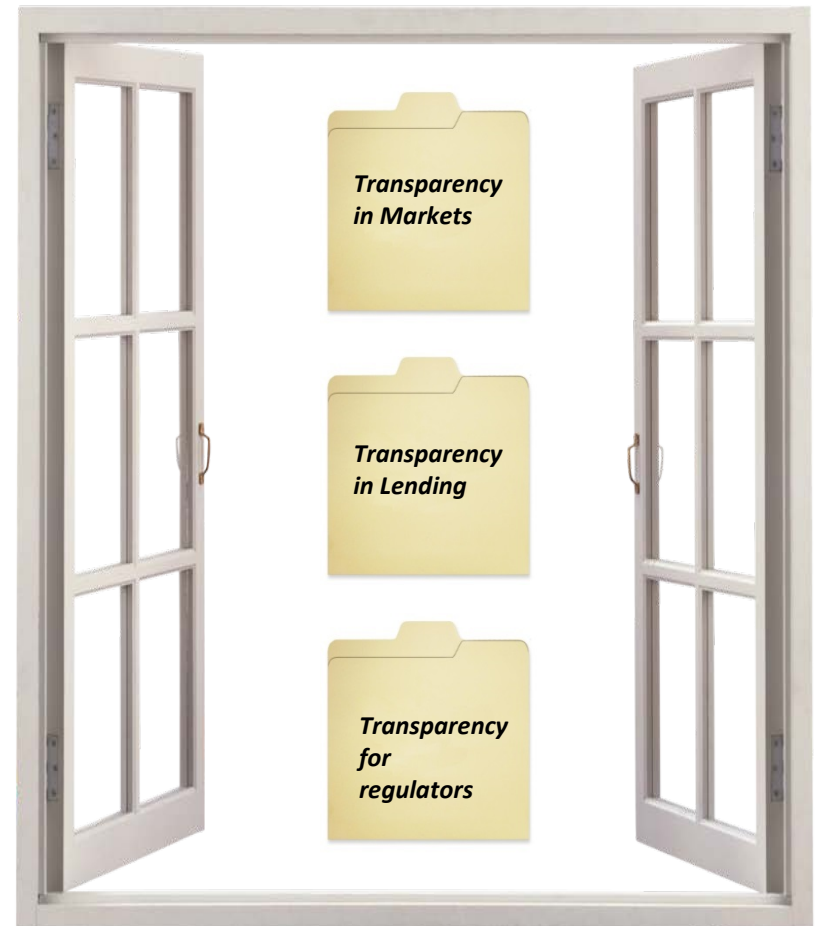
The new capabilities offered by blockchain have the potential to...

...re-draw the map
of the financial
services ecosystem



Blockchain will drive improved efficiency and to disintermediate existing players...

...but the most disruptive impact will be increased transparency



Other implications of blockchain will include...

Embedded Regulation



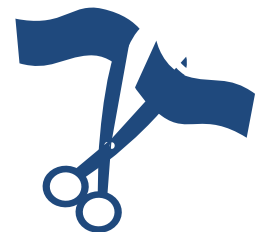
Reduced Settlement Time



Reduced Counterparty Risk



A Shifting Role for Central Counterparties



Building distributed financial infrastructure will be long and complex process...

...and it remains difficult to identify who will be the winners and losers



Questions?



COMMITTED TO
IMPROVING THE STATE
OF THE WORLD

2035 Vision: Investing in the Future



Angelo A. Calvello, PhD

Chief Executive Officer

Impact Investment Partners

- Founder of Impact Investment Partners
 - Advises asset owners, asset managers, and consultants on innovation, product development and distribution
- Co-founder and Chairman of Rosetta Analytics, Inc.
 - Boston-based asset management firm that uses non-traditional data and computational methodologies to create and manage investment strategies
- Columnist for *CIO Magazine*
 - “The Doctor Is In,” won the American Business Media’s 2016 Jesse H. Neal Award for best commentary
- Author of *Environmental Alpha: Institutional Investors and Climate Change* (Wiley 2009)
- Serves on the Board of Directors of the Network for Sustainable Financial Markets
- Serves on the Advisory Board of the Charter Alternative Investment Analyst (CAIA) Association

What Institutional Investing Will Look Like in 20 Years

Angelo Calvello, PhD
July 18, 2016



]HackingTeam[

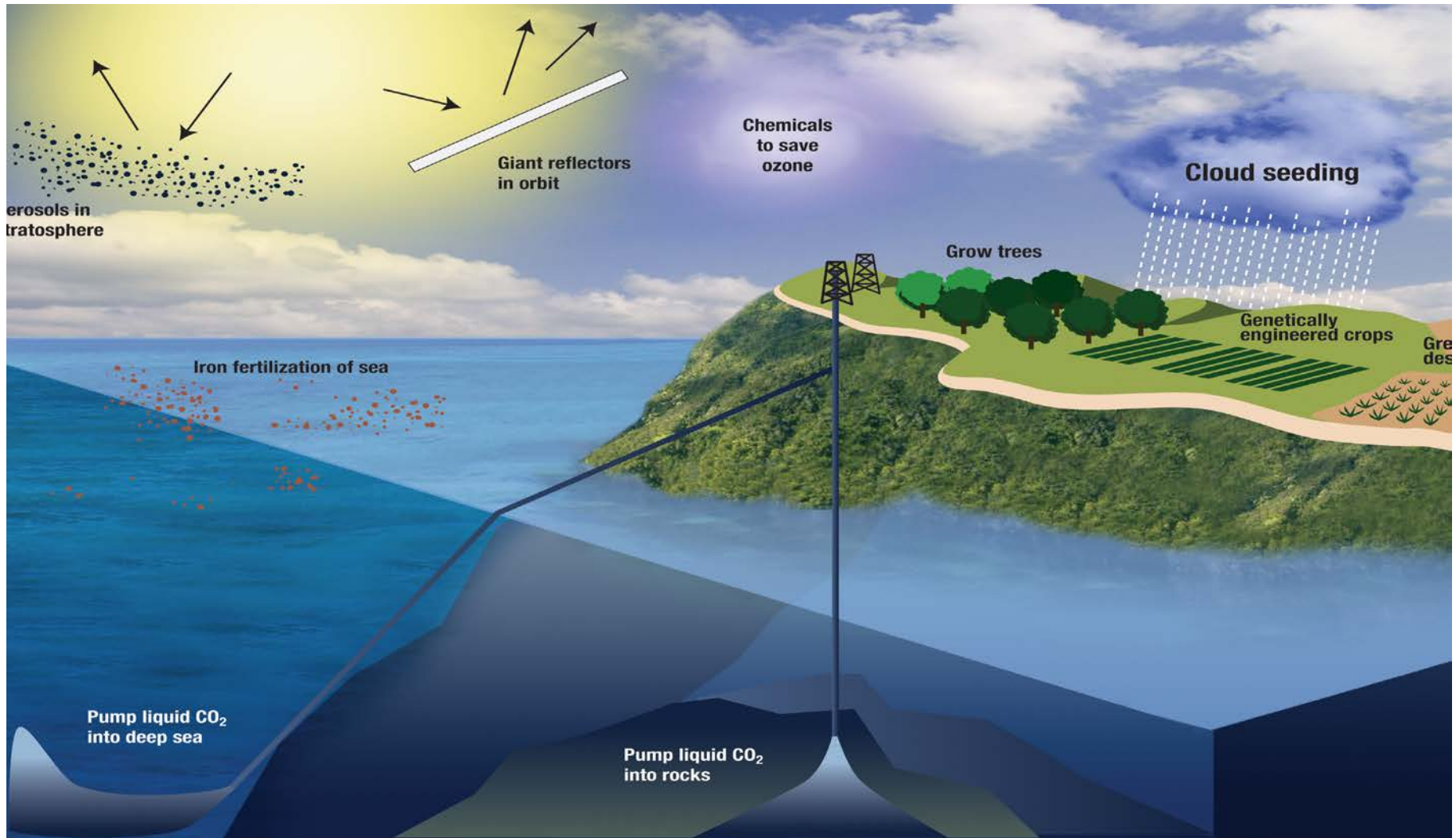
Rely on us.

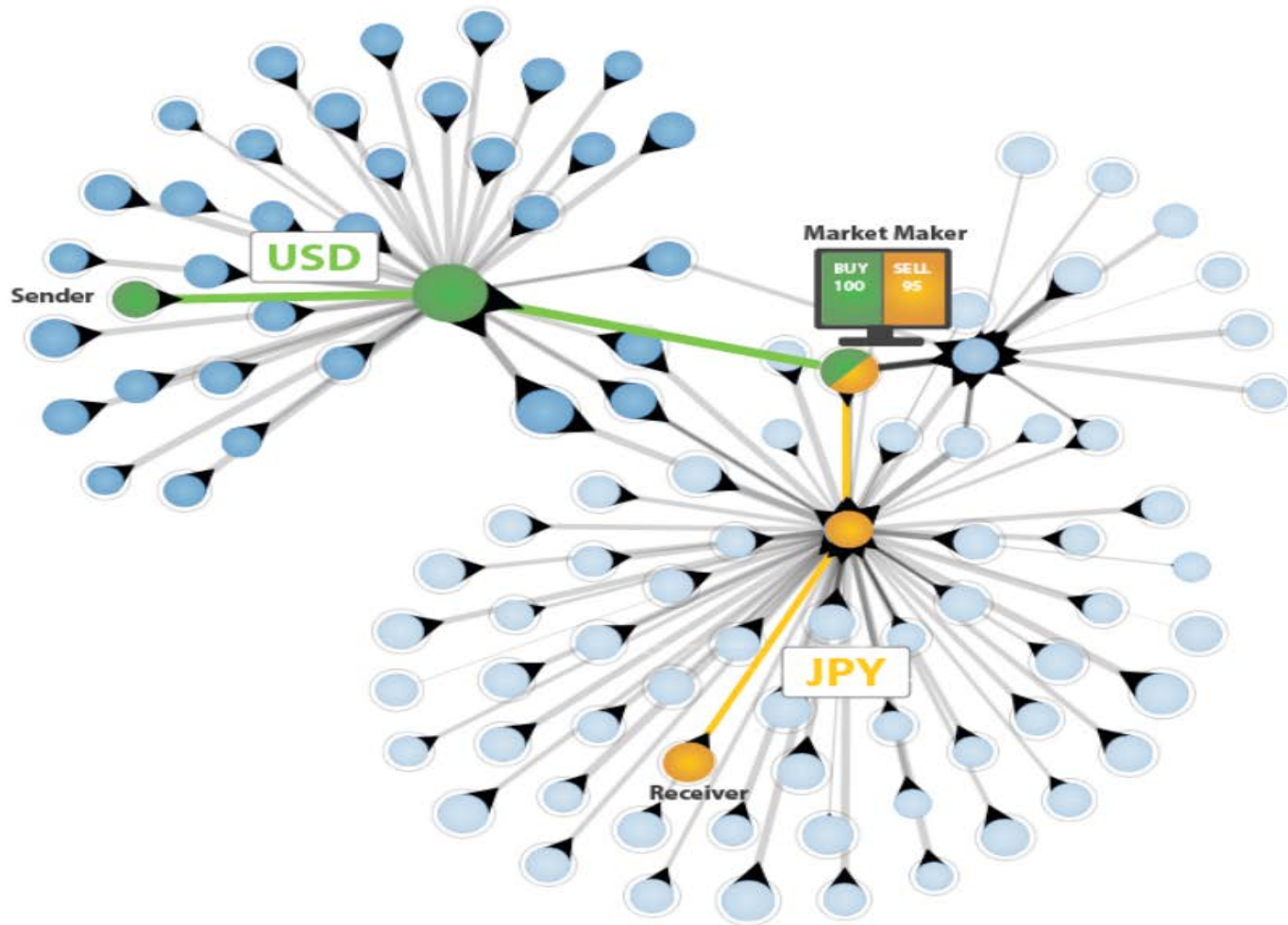




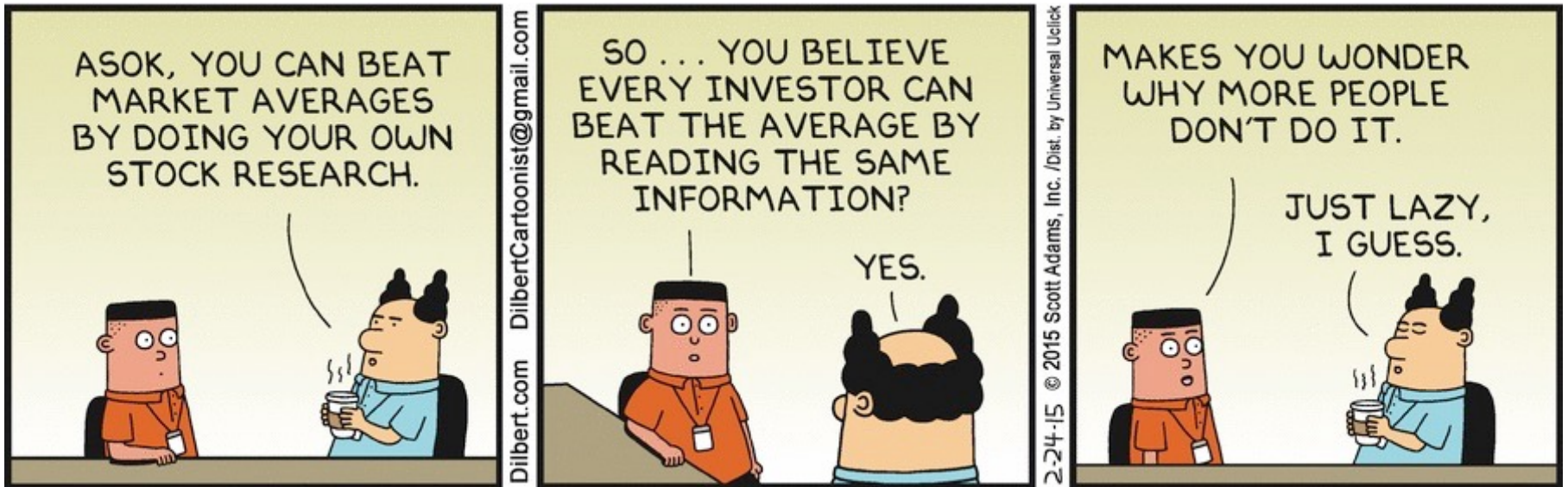


Climate INITIATIVE Bonds







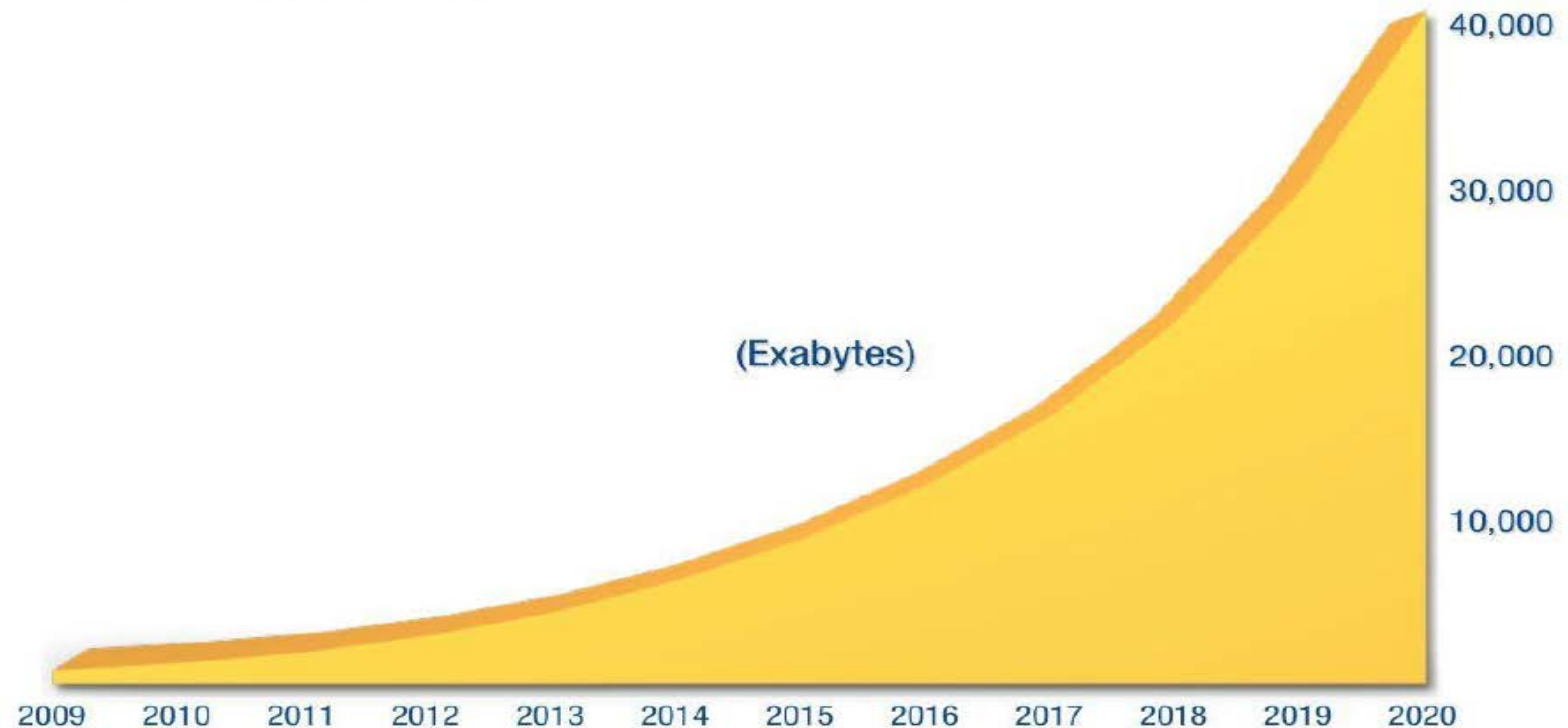


(C) Scott Adams

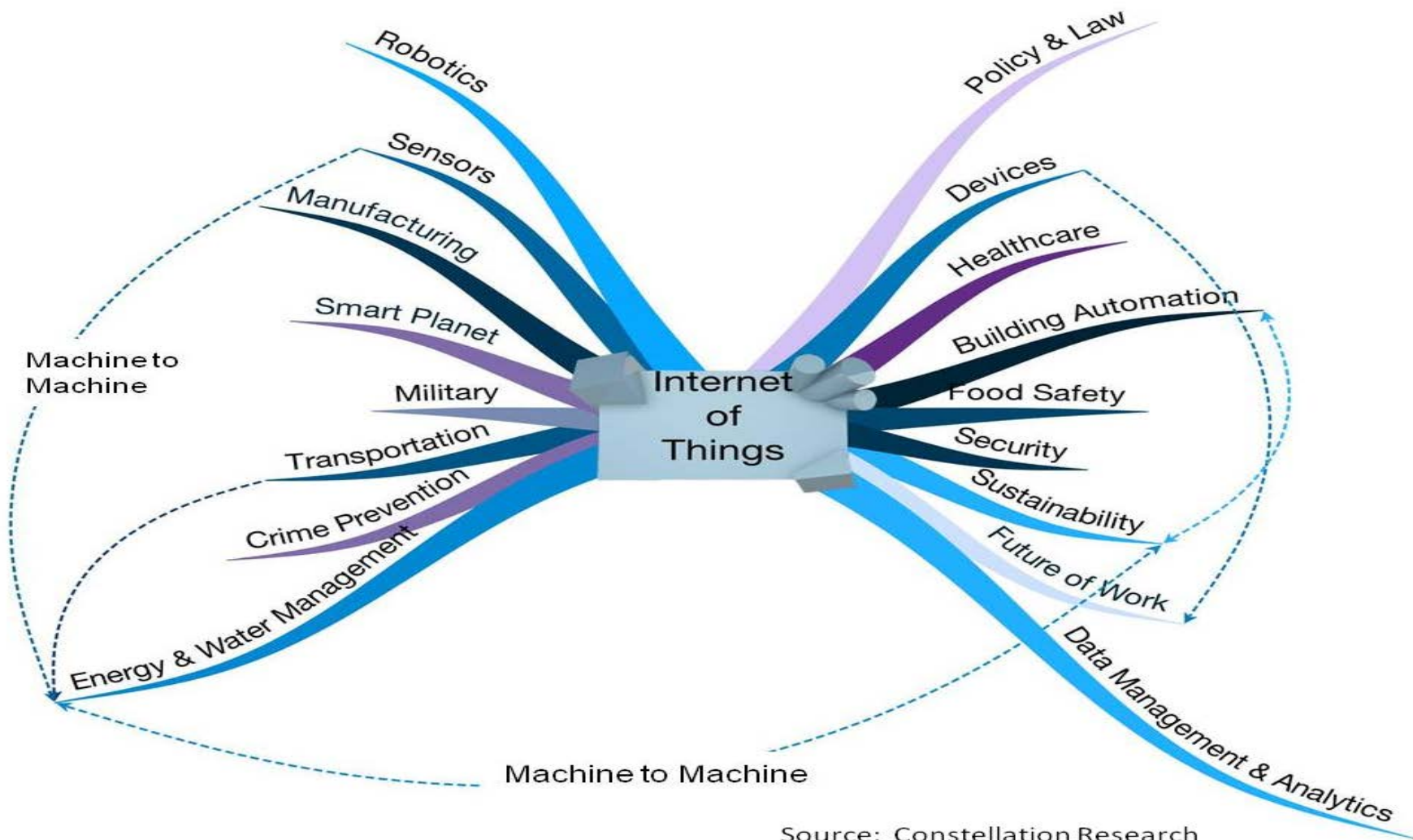




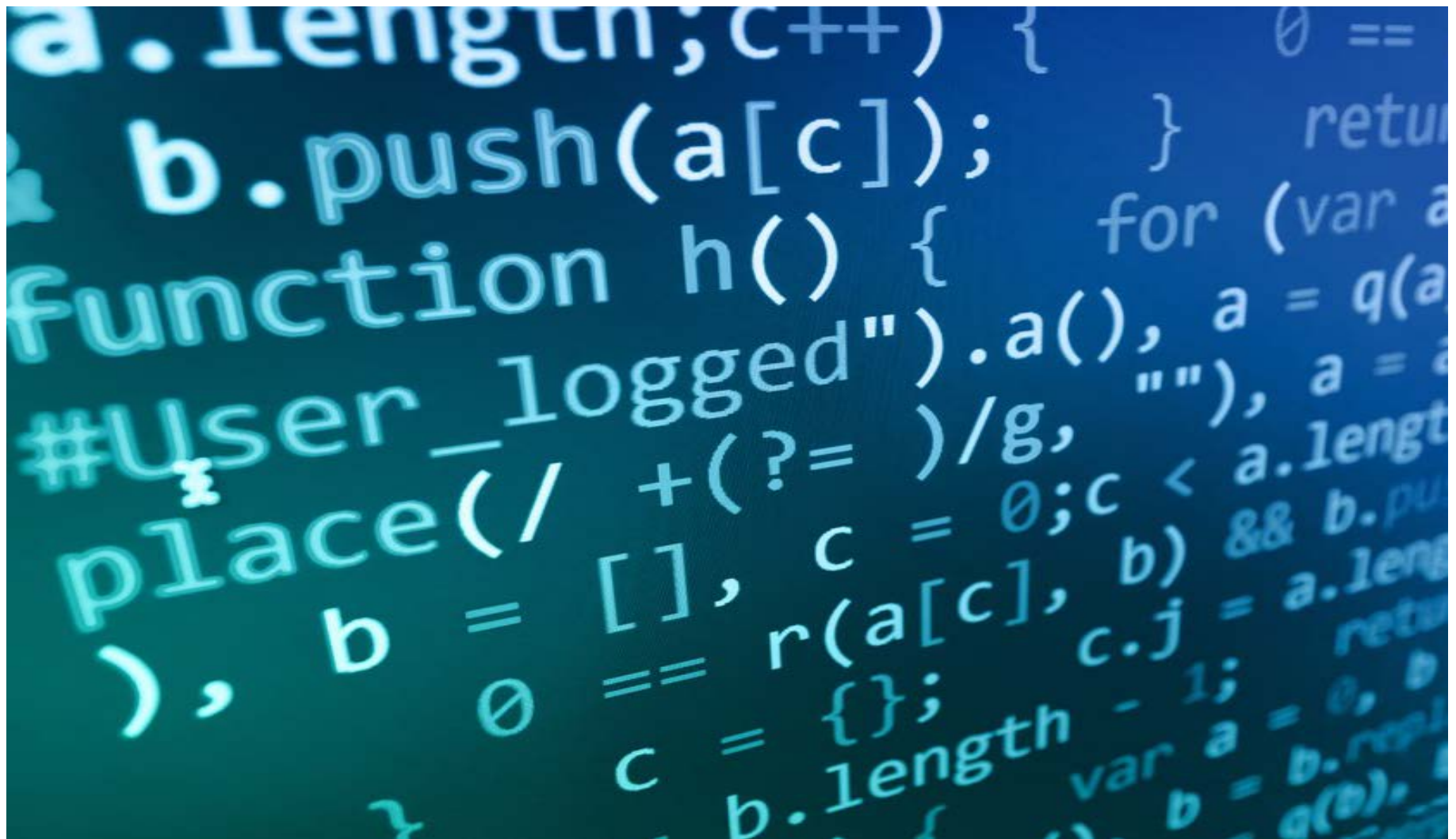
The Digital Universe: 50-fold Growth from the Beginning of 2010 to the End of 2020



This IDC graph predicts exponential growth of data from around 3 zettabytes in 2013 to approximately 40 zettabytes by 2020. An exabyte equals 1,000,000,000,000,000,000 bytes and 1,000 exabytes equals one zettabyte. Source: IDC's Digital Universe Study, December 2012, <http://www.emc.com/collateral/analyst-reports/idc-the-digital-universe-in-2020.pdf>.



Source: Constellation Research



“Information is the oil of the 21st-century and analytics is the combustion engine.”

–Peter Sondergaard, Gartner Research





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Bringing to life digital disruption & innovation at LBG, co-author of a research report at MIT on Digital Transformation (2011). Views are my own.



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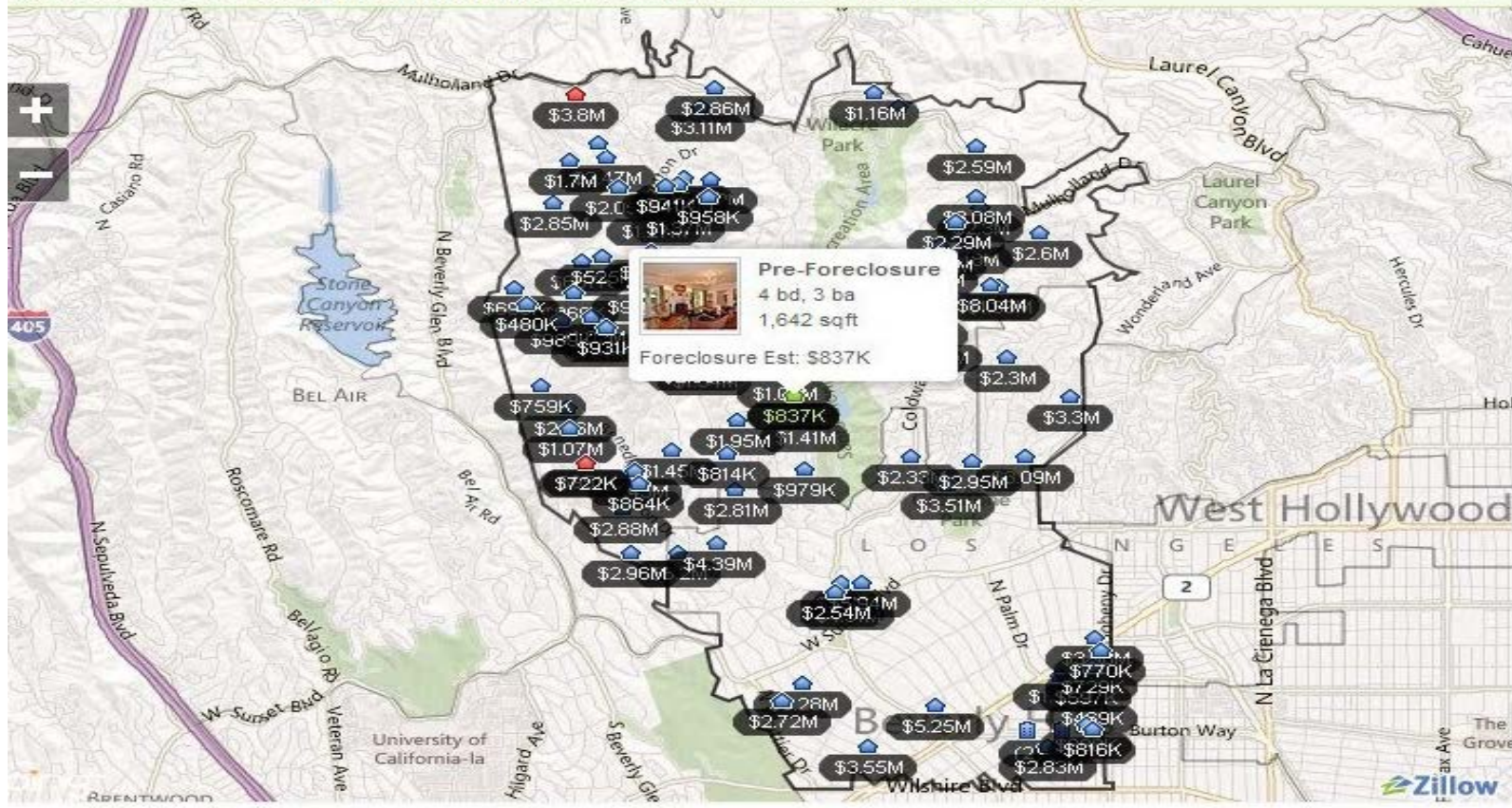
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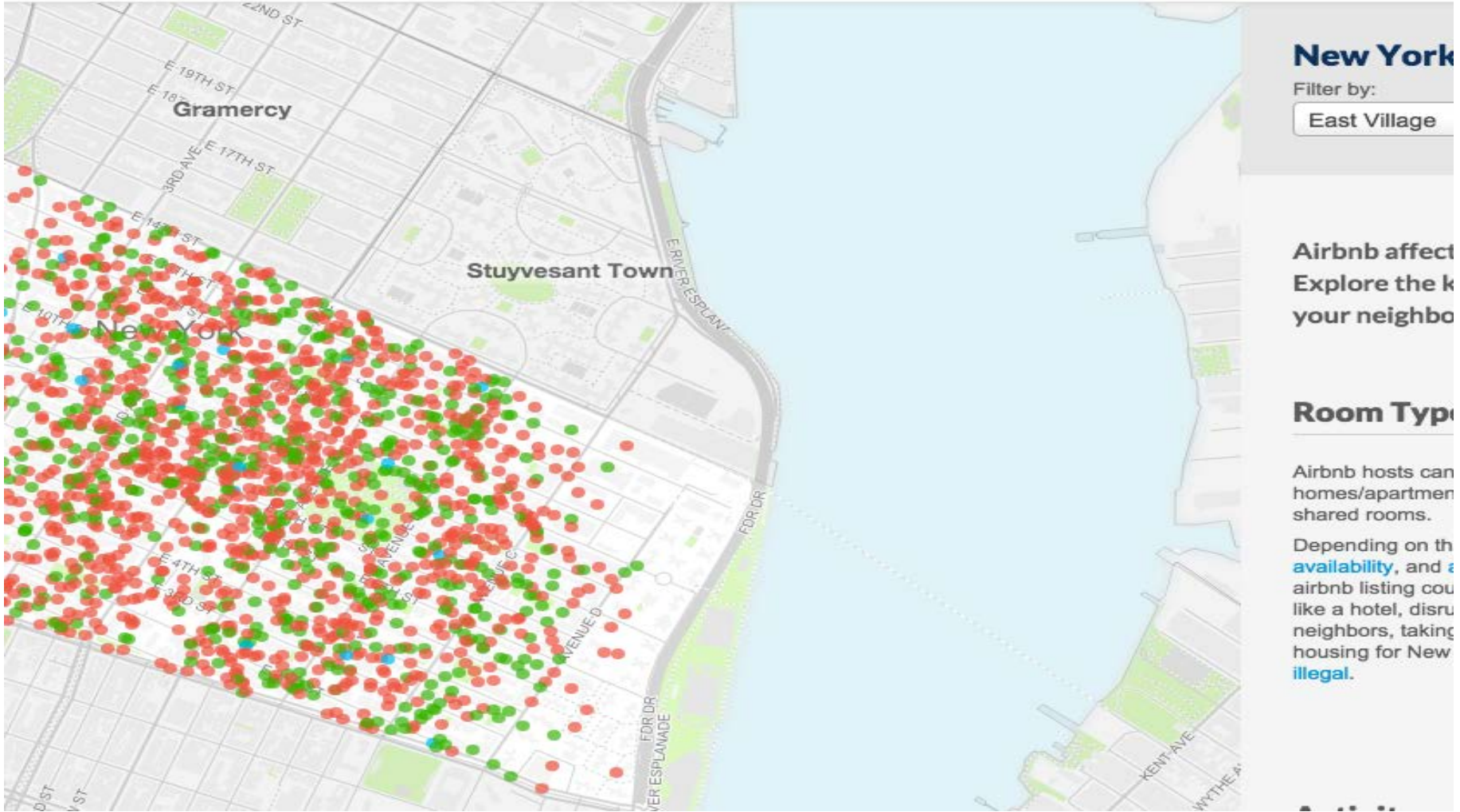
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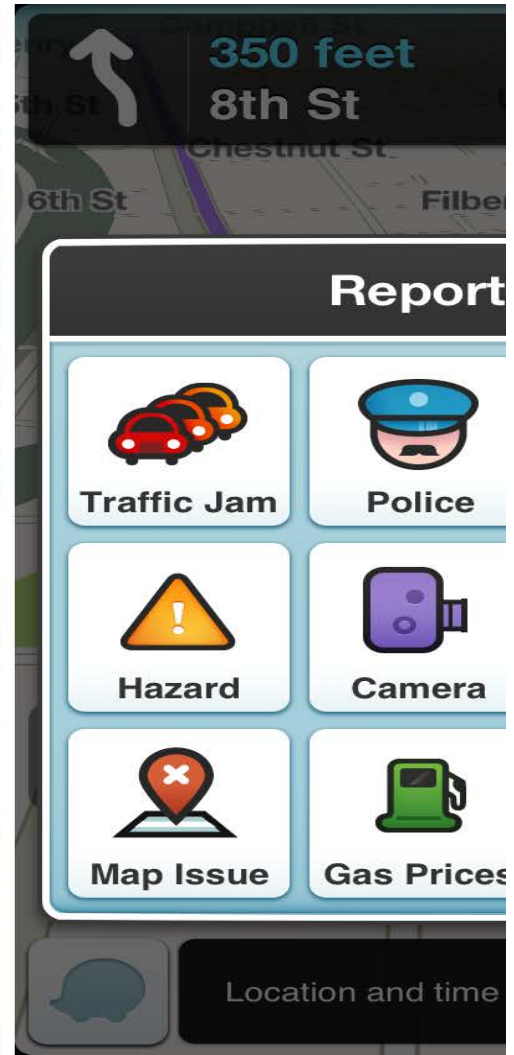
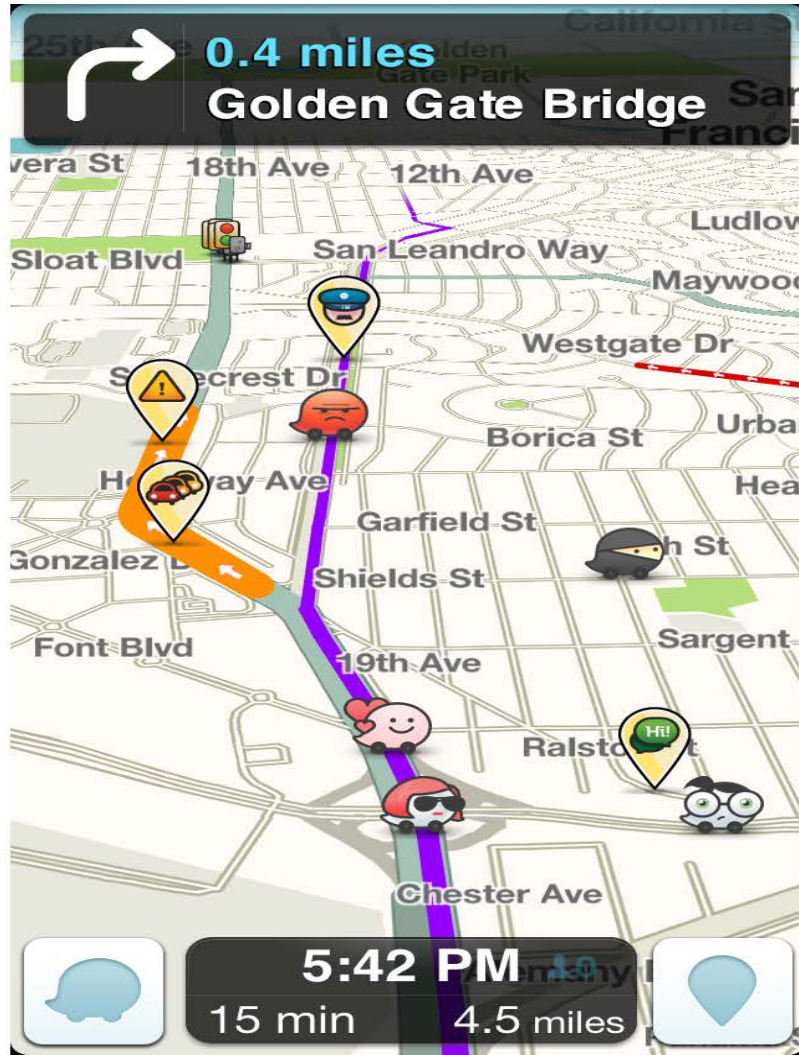
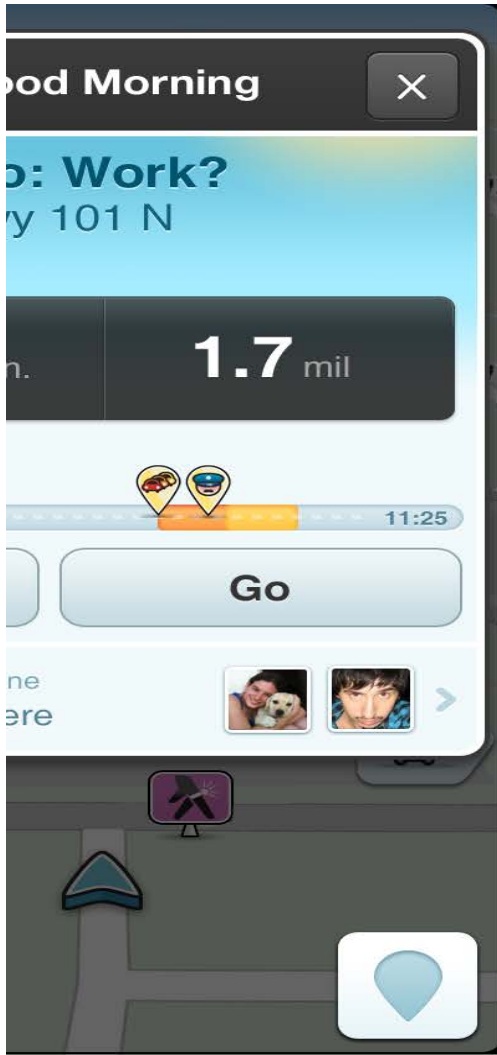


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Millennials are “differentiated by their broad adoption of technology, particularly in their deeply ingrained use of digital and social channels in almost every aspect of their lives.”

–Accenture

-
- Social networks are sources of knowledge
 - Accept the wisdom of the crowd over that of authority figures
 - Gamification as determinant of value
 - Crowdsourcing as a viable economic activity
 - Value DIY culture

“Millennials, like the ‘Greatest Generation’ are shaped by an environment of failing or failed institutions and rising new ones.”

–Breaking Smart

“Today, those of us who aren’t machine learning experts have no conceptual model for what a learner does.”

–Pedro Domingos

Exam Level: Level I
Section: Equity Investments



The weak-form efficient market hypothesis asserts that stock prices will *most likely* fully reflect which of the following types of information?

- A. Market only
- B. Market and public information
- C. Public and private information

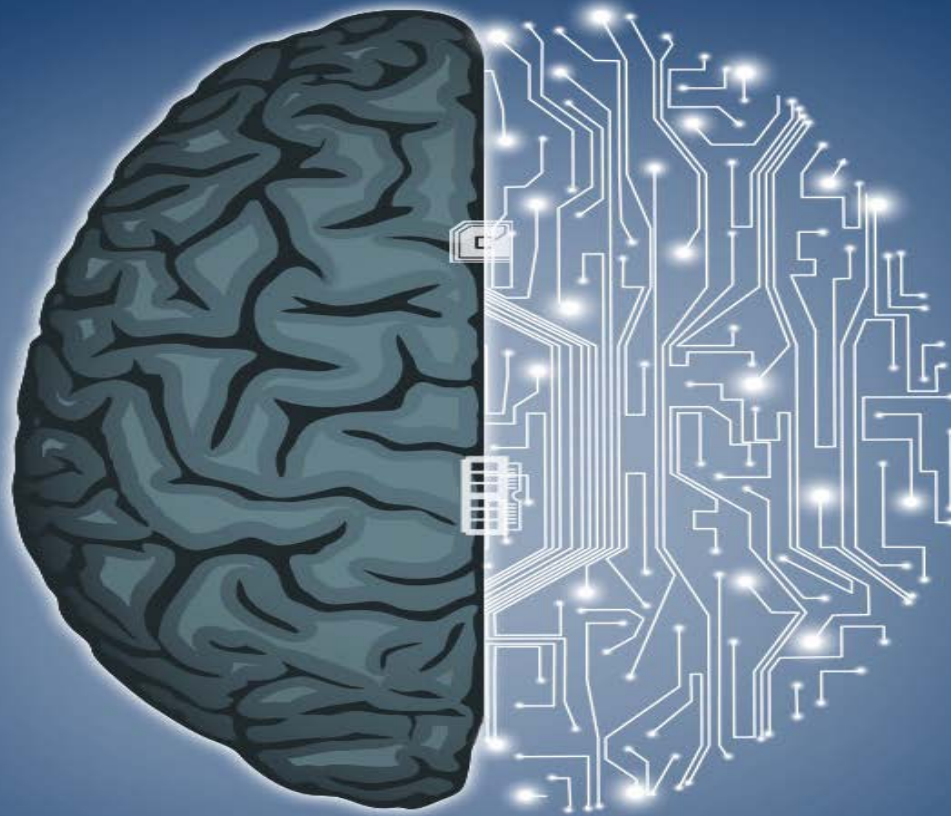
“Accenture analysis shows that by 2020, cross-functional integrated teams will deliver 80 percent of traditional finance services... Your most essential talent will not be ‘finance’ talent at all. Leading companies will look beyond CPAs and MBAs to hire statisticians, data scientists, behavioral scientists, economists and even anthropologists. ”

–Accenture









DEEP KNOWLEDGE Ventures

Google^[x]



“A startup is a company working to solve a problem where the solution is not obvious and success is not guaranteed.”

–Neil Blumenthal, cofounder and co-CEO of Warby Parker



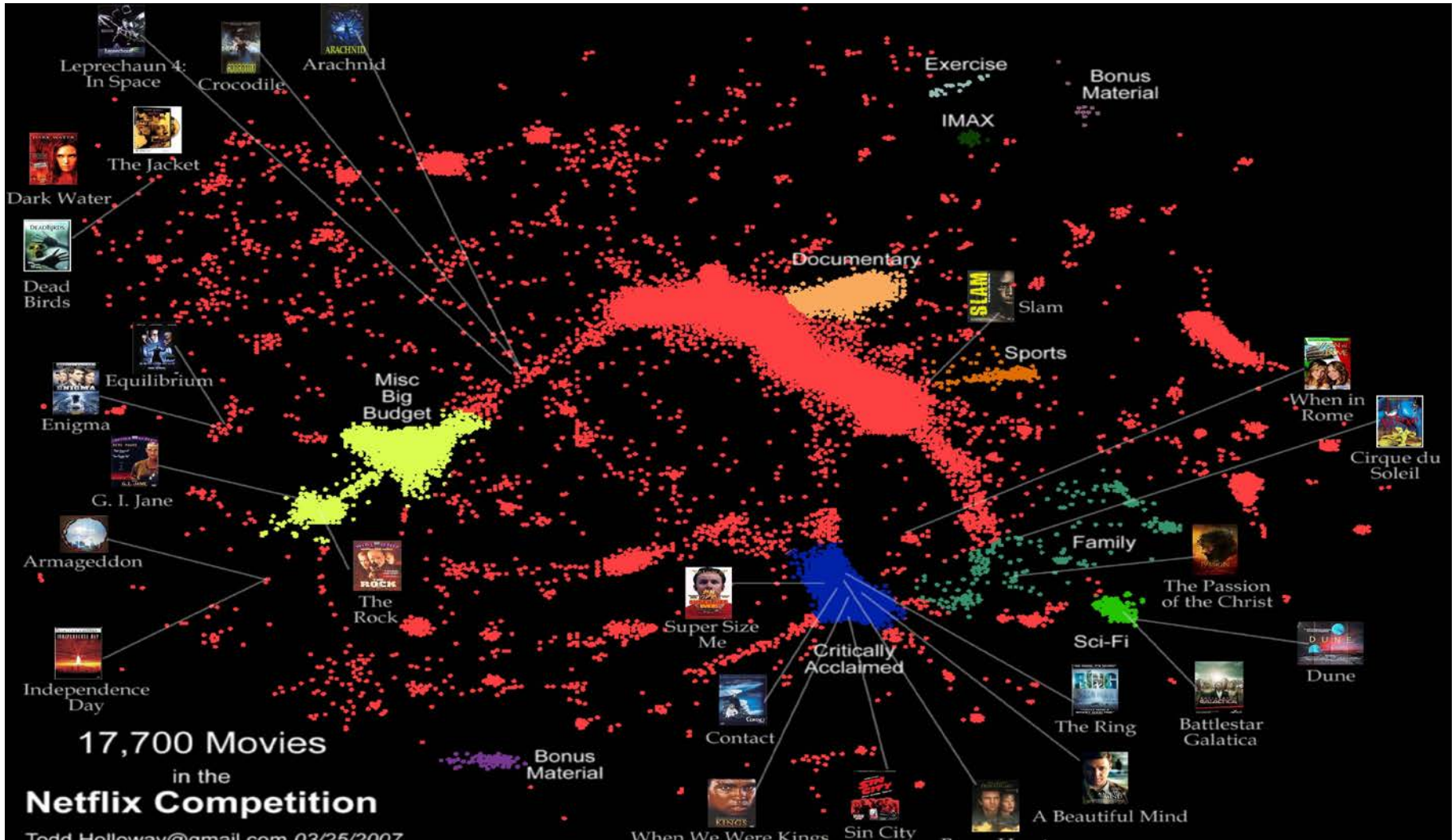












Thank you

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2035 Vision: Investing in the Future



Charles D. Ellis, PhD

Managing Partner,
Partners of '63

- Founder of Greenwich Associates in 1972
- Serves as a consultant to several of the world's largest institutional investors, government organizations, and wealthy families
- One of 11 individuals honored by the CFA Institute for lifetime contributions to the investment profession
- Chairs the Whitehead Institute for Biomedical Research
- Served as a successor trustee of Yale University; on the Visiting Committee of the Harvard Business School
- Taught advanced courses in investment management at Yale School of Management and Harvard Business School
- Author of 18 books, including *The Partnership: The Making of Goldman Sachs*; *Capital: The Story of Long-Term Investment Excellence*; and, *Winning the Loser's Game*

NYSE Changes Over Past 50 Years

<u>Mix</u>		<u>Volume</u>		<u>Derivatives</u>
10:90		1.5M		0.0
↓	+	↓	+	↓
98:2		5,000M +		5,000M +

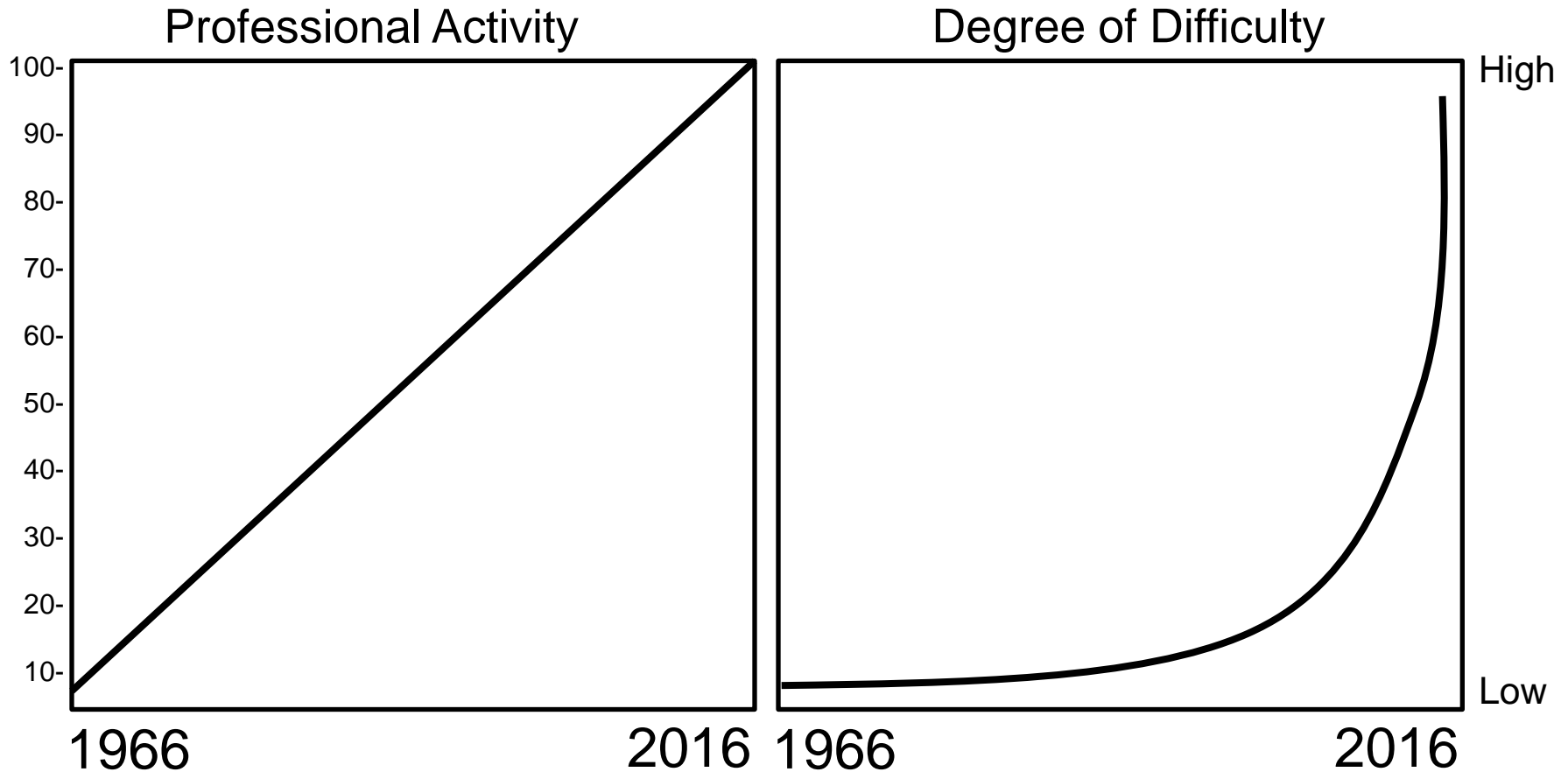
Major Changes Over 50 Years

- 300, 300, 300 + & + &
- Analysts, economists, demographers, strategists, industry analysts, company experts
- MBAs and PhDs and MDs
- 120,000 CFAs (and 300,000 candidates)
- Computer models
- Reg FD: Fair Disclosure
- Bloomburgs: 320,000 ++
- Internet, voice mail, global networks

Know Your Opponents

- 50 = 50%
- \$100M + up
- 2 'n' 25 = High motivation: HF, PE, Activists
- Algorithmic trading
- Globalization of investors
- Globalization of investment
- Mega markets: Stocks + Bonds + FX + RE + Oil + Gold

More Experts = Accelerating Challenges



Disagreeable Data: Top Secret I

- Mutual funds underperform their chosen targets
 - 60% over “typical” year
 - 70% over 10 years
 - 80% over 20 years
- Losers lose twice as much as winners win

Disagreeable Data: Top Secret II

- Institutional Investors Underperform
 - 75% About average
 - 25% Clearly below market average
 - 0.1% Clearly outperform market

The Great Inversion of the Past

Then:

Client
Manager

Now:

Manager
Client

The Great Inversion of the Future?

Now:

Manager

Client

Then:

Client & Manager

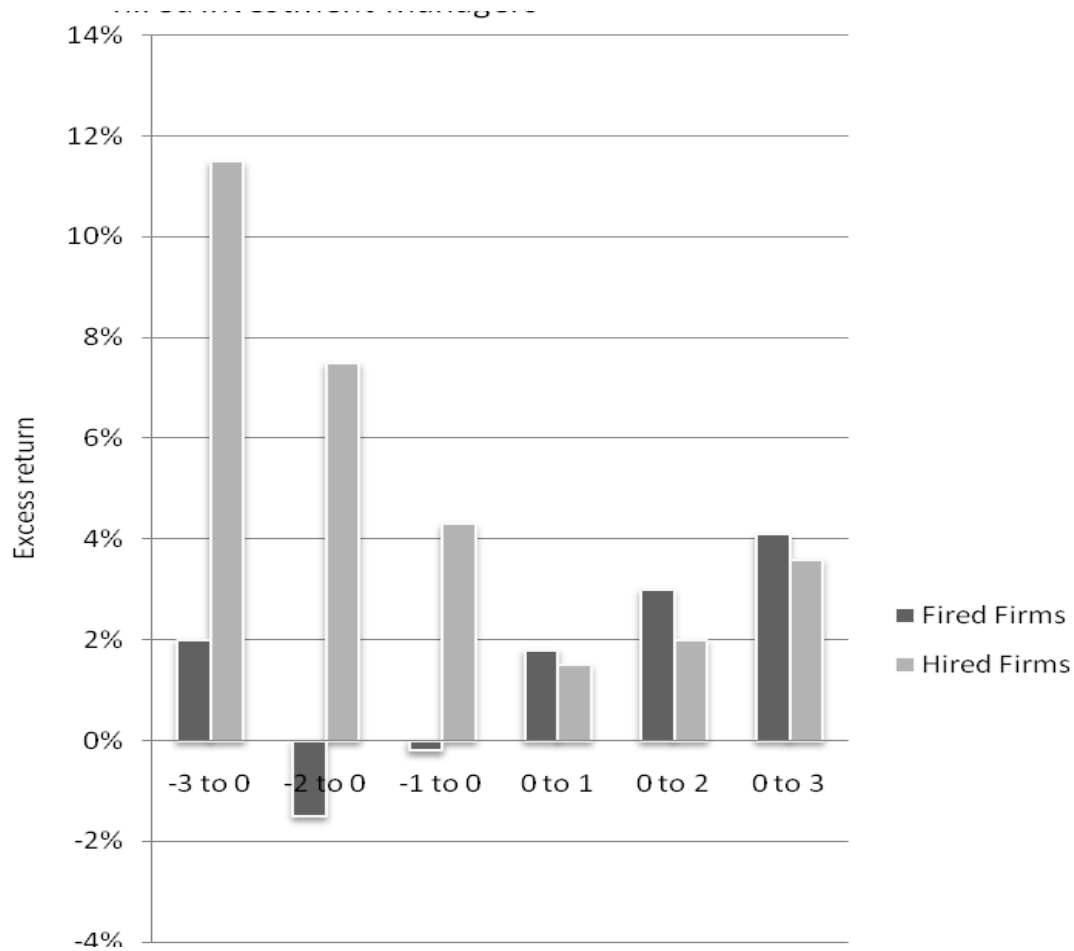
All Funds Are Equal Because...

- Free to choose
- Want to do well
- Want to avoid harm
- Know choices matter
- Lots of choices available

Each Fund Is Different on...

- Time horizon
- Assets
- Actuarial assumption or spending rule
- Risk tolerance
- Obligations
- Importance to constituents
- Source of contributions
- Governance

Hired vs. Fired Managers



Changing Managers?

- Small problem:
 - Hired managers fall below fired managers
 - Costs to change are significant
- Mid sized problem:
 - Performance before firing
- Large problem:
 - Hiring to fire
 - Repeat
 - Repeat

Einstein understood, but can we?

1st Objective:

Understand our fund's real goals

- Tolerance for risk in...
 - Assets
 - Funding ratio of 70%
 - Distributions to retirees
 - Liquidity for operations
 - Perceptions by public
- Tolerance for uncertainty
- Utility of over vs. under performance
- Ability to stay the course

2nd Objective: Do No Harm

- Being too conservative
- Being too bold
- Buying high; selling low
 - Asset class
 - Manager
- Converting temporary loss into permanent loss

3rd Objective: Strong Defense

- Risk of real harm is # 1 focus
- Robust portfolio structure
- Manager selection
 - Beware of business vs. profession
 - Manager's strategy for growth in capacity
- Manager management
 - Compensation alignment
 - Changes in manager's business
 - Changes in manager's "style"
 - Changes in leadership
 - Actual growth in AUM vs. capacity

4th Objective: Wise Governance

Determine strategy to achieve fund's goals

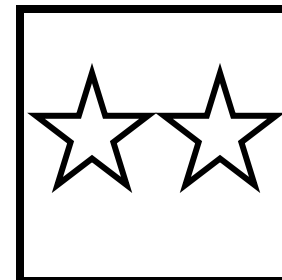
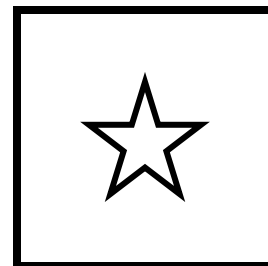
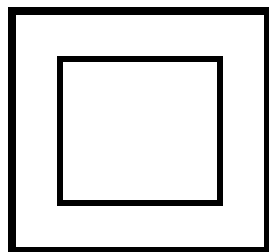
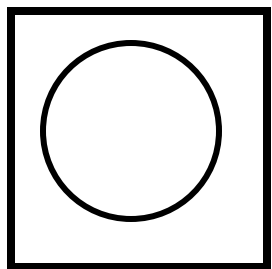
- Right for market realities
- Right for CalPERS organization
- Right for long-term returns
- Right for CalPERS risk tolerance
- Feasible and realistic for managers

5th Objective: More???

Looks easy, but results are not encouraging...

- Fund managers underperform
- Past “data” not predictive
- Costs of reaching for “more”
 - Changing managers
 - Changing asset mix
 - Innovating
- Tom Wolfe’s lesson: *The Right Stuff*

Ski Lesson



Our Great Responsibilities

- Know our constituents
- Know our policy options & constraints
- Make our own choices
- Define our investment objectives
 - Risks
 - Returns
 - Liquidity
- Design our strategic portfolio
- Stay the course

Top Secret: The Truth about Fees

- ½% of assets
- 8% of returns
- 75-150% of incremental returns

Caveat Emptor: Be sure you know what you are really buying

Active Management Today: By Clients

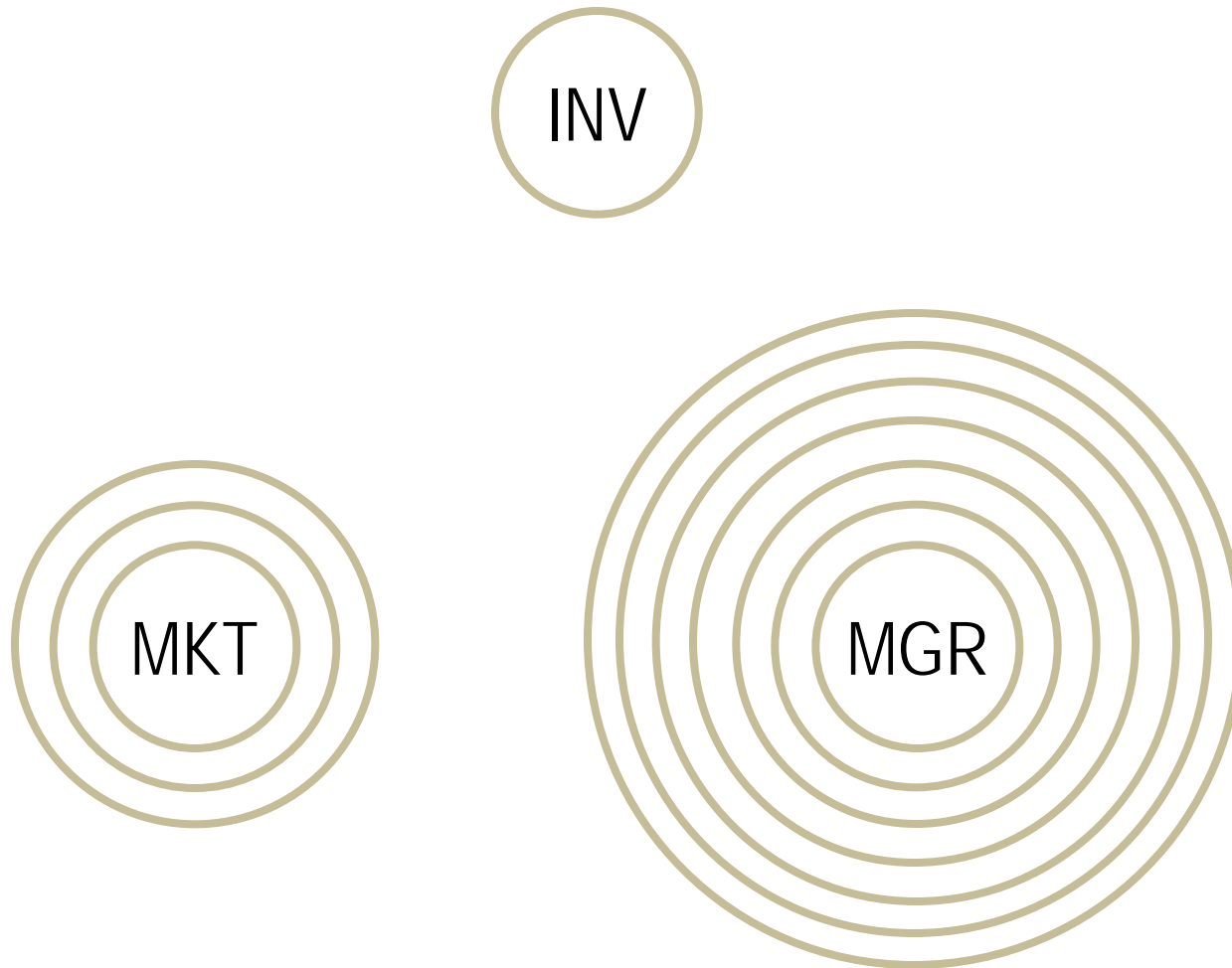
- Knowing real objectives and balancing risk, returns, and liquidity
- Agreeing on important policies
- Designing strategic portfolio
- Overseeing manager management
- Maintaining discipline in process
- Deciding on indexing

What Really Matters

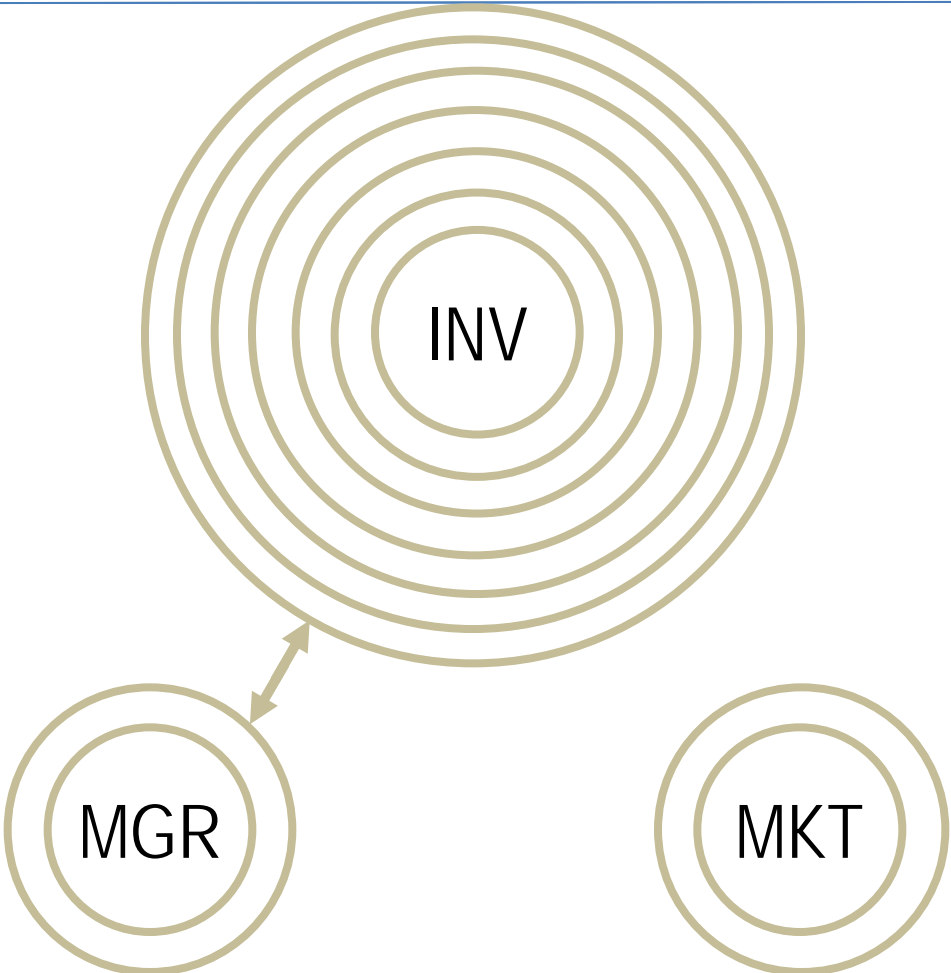
- Value Discovery?
- Price Discovery?

Understanding the investor is at least as important as understanding the markets

Old Concept of Active



New Concept of Active



Without Good Governance...



Panel Discussion – How will we invest in 2035?

- Any "big" risks you can foresee in the market? including potential bubbles that may result from current central bank policy, lingering low interest rate environment, technology company valuations, etc.?

How will the nature of
Fiduciary responsibility and
duty differ in 2035?

How will man and machine
integrate to create efficient
markets?

Will there be shifts in information and power
"symmetries" between Asset Managers and Asset
Owners?

- For environmental/climate change related
discussions, what are specific risk mitigation
strategies we need to consider?

- Merits and challenges of establishing local offices
overseas, in particular, issues related to civil service
requirements and other personnel or legal risks?

What new skill sets will investors require in 20 years?

Will the Active vs Passive debate ever be over?