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John Hancock Investment Management



Artificial Intelligence Fiduciary

Dr. Gregory W Kasten Chief Executive Officer Unified Trust Company

Welcome!



"Hello" I am Gregory Kasten.

This session will explore how AI is changing the financial services industry and Artificial Intelligence Fiduciary may be the future.

Disclosures

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Three Part Discussion

- 1. Introduction to AI
- 2. Fintech Changing the Industry
- 3. Fintech Improving Outcomes

Three Part Discussion

1. Introduction to Al

The Times Are Changing Do More With Less Why Efficiency Matters



Efficiency Required



Adjusting to the squeeze of fee compression

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From competitive pricing cuts that defy logic to the increasing cost of cybersecurity and other expenses, the pressure is on 401(k) record keepers to adapt or die

By Greg lacurci | November 9, 2019 - 6:00 am EST

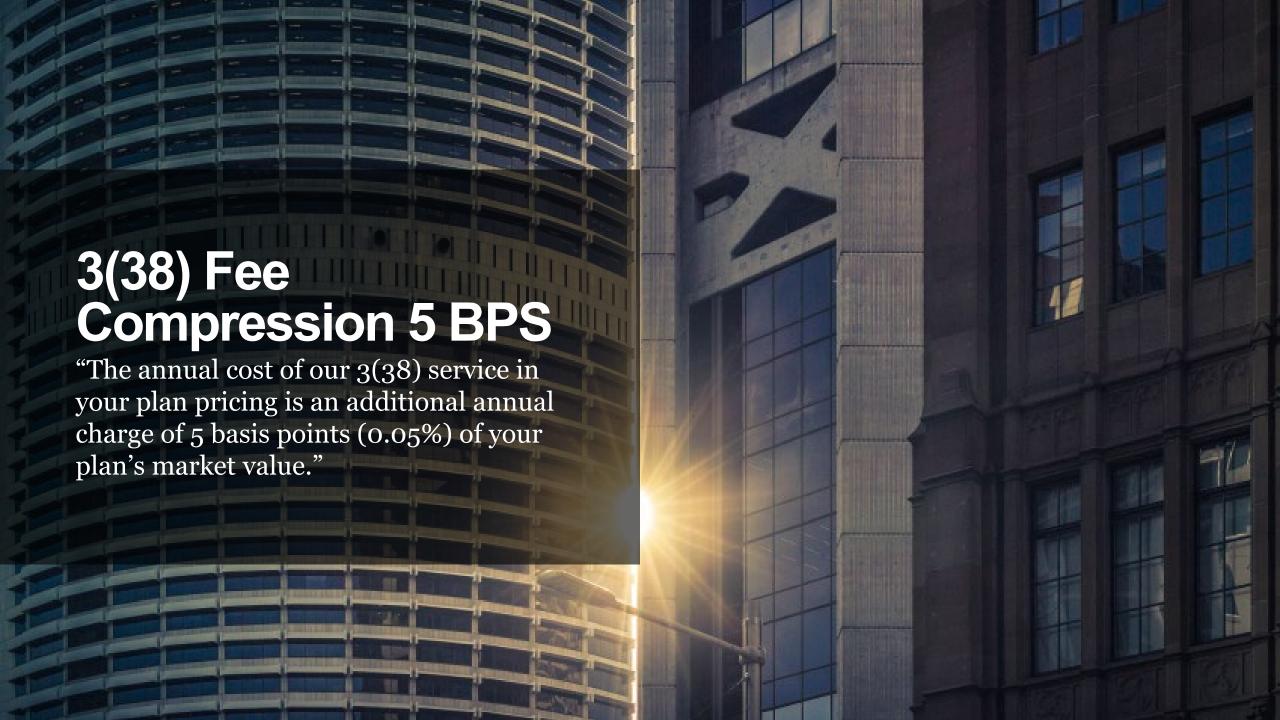
Even as 401(k) record keepers have found ways to adapt to the reduction in revenue caused by ongoing and drastic fee compression in the retirement industry, other revenue threats loom from financial advisers and retirement-plan lawsuits, according to more than a dozen defined-contribution record-



Real World Client Plan "All In" Cost

- Plan Administration
- Recordkeeping
- Fund Expenses
- Stable Value
- 3(38)
- Custody
- Education

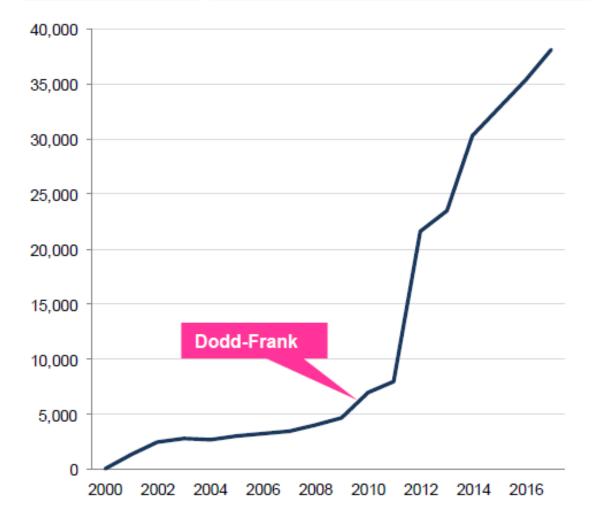






Regulatory Compliance More Difficult

Cumulative Pages of Financial Regulation Since 2000



Source: Autonomous Research, LLP April 2018

 The last decade has seen a steady increase in writing dedicated to financial regulation



Regulatory Compliance More Difficult

- Nearly 30,000 pages of financial regulation have been added in the United States alone and this has led to billions of venture capital funding for the regulation technology (RegTech) category
- Reg BI and DOL Fiduciary Rule have cost the industry more than \$10 Billion
- "Real Time" CEFEX, plan administration and fiduciary portfolio complexity
- Managed account compliance generates 77 million data points per plan participant per year, 19.4 billion per plan



SEC Reg Bl—1,438 Pages

9. Effective Date

The effective date for Regulation Best Interest is September 10, 2019. The compliance date is June 30, 2020.

10. Other Resources

The adopting release for Regulation Best Interest can be found on the Commission's website at https://www.sec.gov/rules/final/2019/34-86031.pdf.

The adopting release for Form CRS Relationship Summary and Amendments to Form ADV can be found on the Commission's website at https://www.sec.gov/rules/final/2019/34-86032.pdf, the Form CRS Instructions can be found on the Commission's website at https://www.sec.gov/rules/final/2019/34-86032-appendix-b.pdf , and Form ADV General Instructions

can be found on the Commission's website at https://www.sec.gov/rules/final/2019/34-86032-appendix-a.pdf.

The Commission Interpretation Regarding Standard of Conduct for Investment Advisers can be found on the Commission's website at https://www.sec.gov/rules/interp/2019/ia-5248.pdf.

The Commission Interpretation Regarding the Solely Incidental Prong of the Broker-Dealer Exclusion from the Definition of Investment Adviser can be found on the Commission's website at https://www.sec.gov/rules/interp/2019/ia-5249.pdf.

45 Pages

564 Pages 17 Pages 770 Pages

14 Pages

28 Pages

1,438 Pages

Three Part Discussion

- 1. Introduction to Al
- 2. Fintech Changing the Industry

Automation Potential Is High

Source: Autonomous Research, LLP April 2018

Automation Potential of Industry (McKinsey 2017)





Workplace Automation



Ordinary Process

Machine Automation



Extraordinary Result or Event

Human Intervention

Cost Savings Are Coming

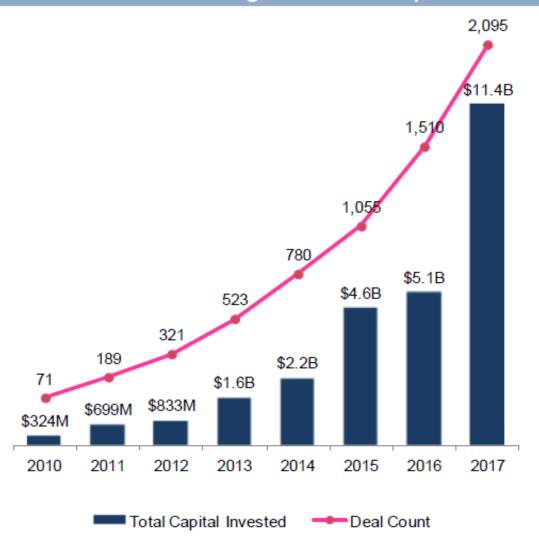
- In US alone, 2.5 million financial services employees will be exposed to AI technologies
- Potential cost savings of \$490 billion in front office (distribution)
- \$350 billion in middle office
- \$200 billion in back office
- In total some \$1 trillion in savings across banking, investment management and insurance



Efficiency Required

- +40 to +50% gains in FTE productivity, or unemployment
- At least -25% reductions in costs
- Investment Management industry to see \$200 billion in AI impact, which is a -38% reduction of the traditional cost base
- Regtech implementation of AI varies according to industry, but one core capability is ongoing monitoring of company communications, financial transactions, vendors, brand reputation and employee processes

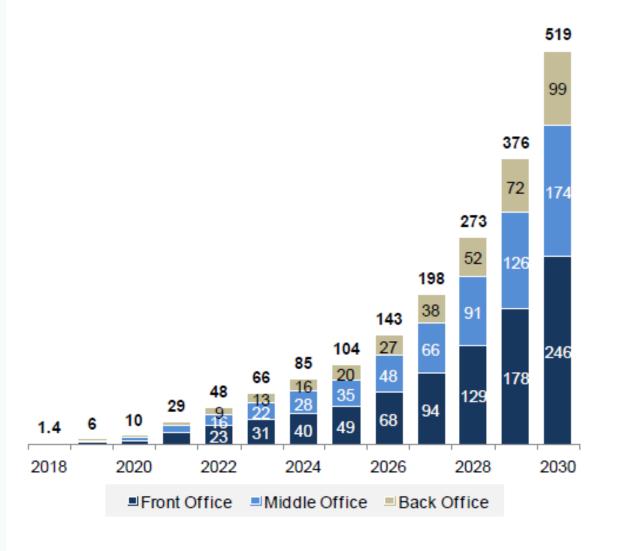
Venture Funding into AI companies



VC Flowing Into Al Deals

\$500 Billion in Revenue from Fintech

Revenue Pool for Fintech Al (\$ Billions, Growth Case)





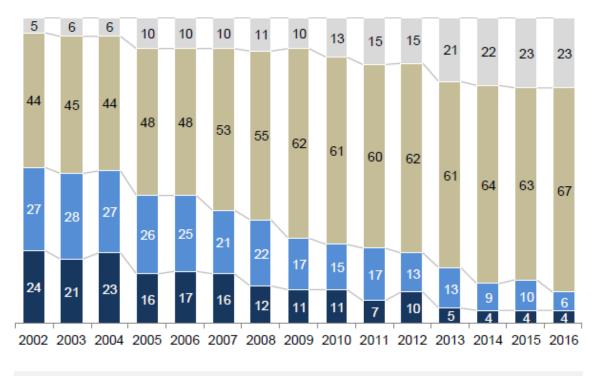
Intelligent Automation

Intelligent automation is defined as: The combination of **Artificial intelligence** (AI) and **Robotic Process automation** (RPA) systems which senses and synthesizes vast amounts of information and streamlines entire processes.

These workflows (applications ranging from routine to the revolutionary), allow **machine learning** to adapt as it goes to achieve unprecedented levels of efficiency, quality and making complex decisions faster.



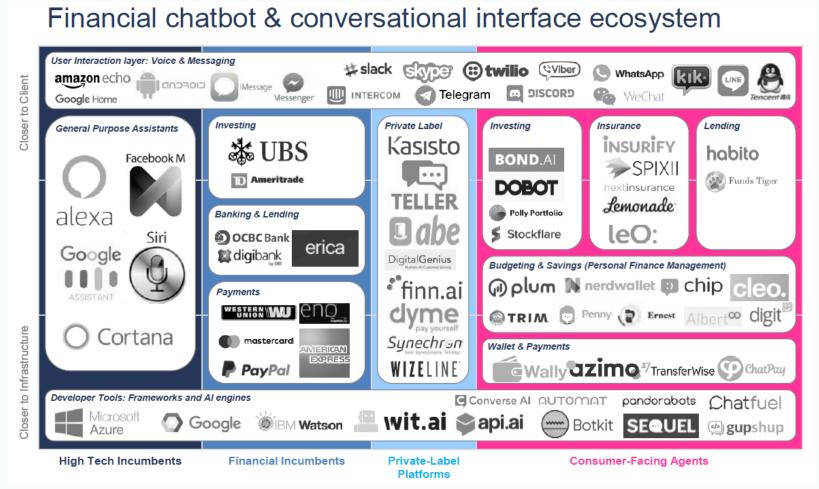
Frequency of Visiting Bank in Norway



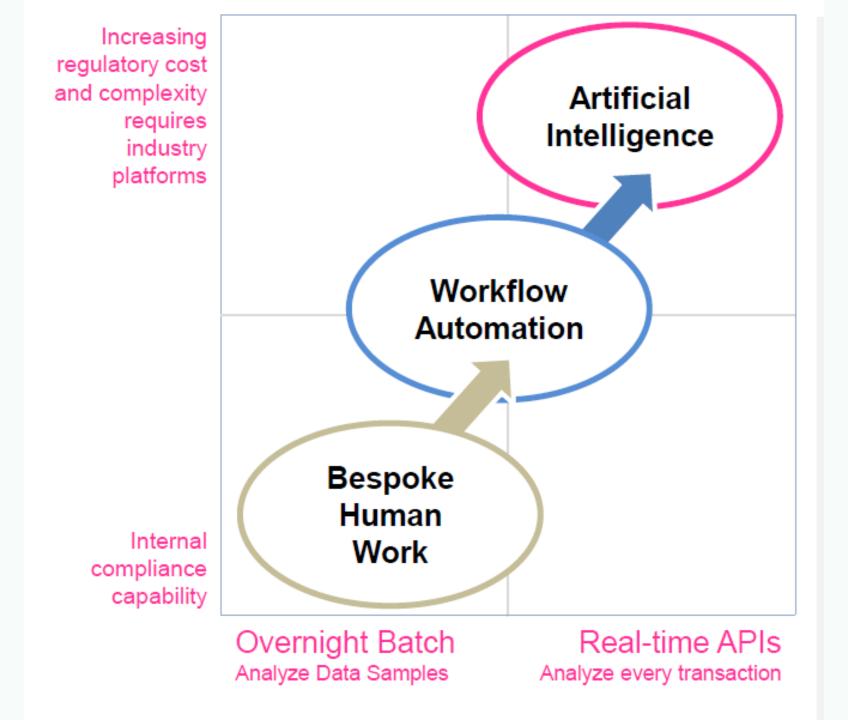
■Every 14 days or more ■Every month ■Every six months or less ■ Never

Al Will Change Client Servicing

Huge Increase in Chatbots







BARRON'S

2020: Get Your Data House in Order

Nov. 8, 2019 at 3:31 p.m. ET By Susan Glover

Share Tools















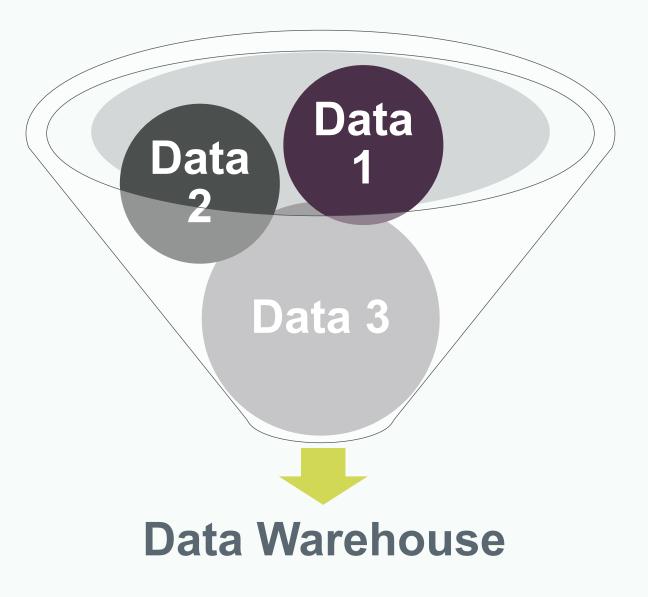
Think about when you made wrong decisions for your firm. I bet those decisions were based on reports containing incorrect data. It's frustrating when this happens once. After several occasions, it's time to do something about it.

An unanticipated consequence of AI and data analytics popularity is the increased concern about data quality within these technologies. Your client relationship may be enhanced by the nice-looking graph, risk profile explanation, and the simulated projected account value; but, if those results were based on incorrect data, your client experience has just dropped a few notches.

The phrase "big data" doesn't translate to quality data. Many firms understand this and are elevating data governance responsibilities on the priority ladder by creating a chief data officer role. Data accuracy and consistency across all technologies are part of this role.

If you don't have the capacity for a full-time data governance role, several data audits can determine if your data is clean or needs additional scrubbing. Let's

What is a "Data Warehouse?"





A Data Warehouse...

- Is generally for static data and not transactional data
- A core component of business intelligence
- Integrates data from multiple sources into a single database and data model
- Runs on a cloud system such as Microsoft Azure
- Improves data quality, by providing consistent codes and descriptions and flagging
- Can detect and "fix" bad data

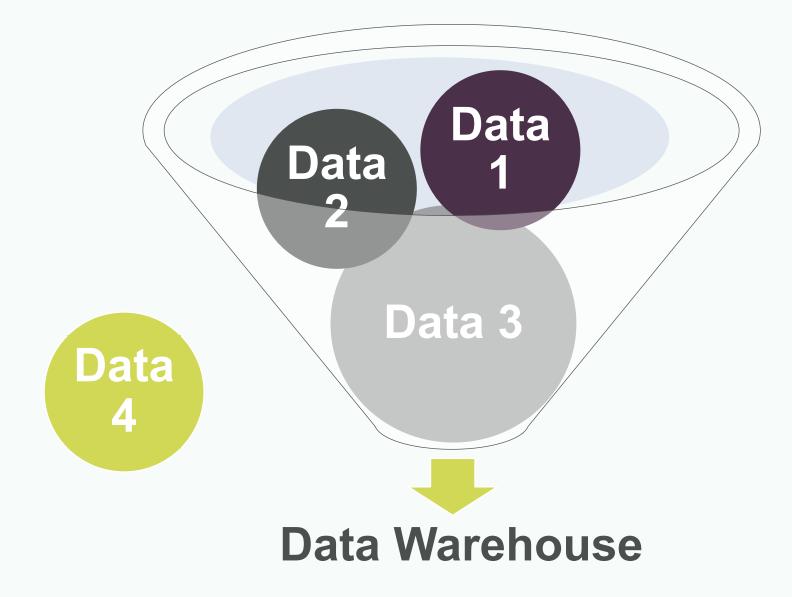


A Data Warehouse...

- Provides a single common data model for all data of interest regardless of the data's source
- Maintains data history, even if the source transaction systems do not
- Presents the organization's information consistently
- Restructures the data so that it makes sense to the business users
- Restructures the data so that it delivers excellent query performance
- Can handle complex analytic queries without impacting the operational systems

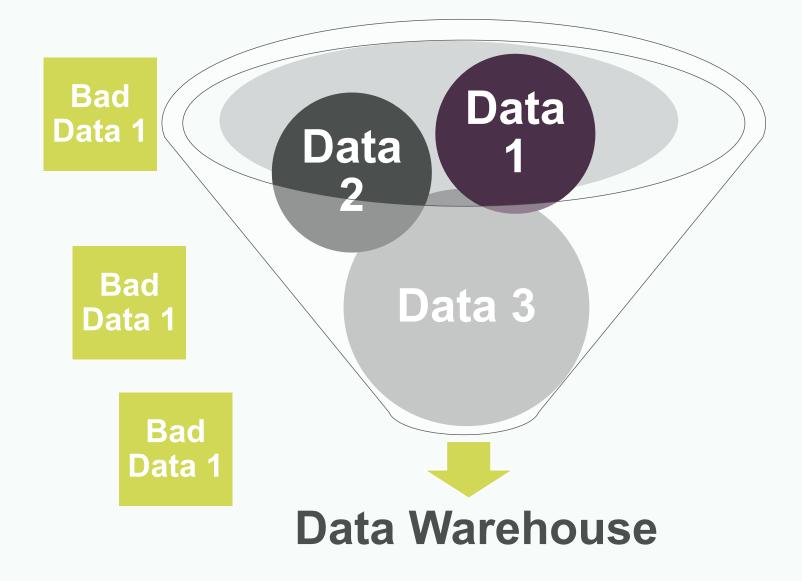


What about Outside Data?



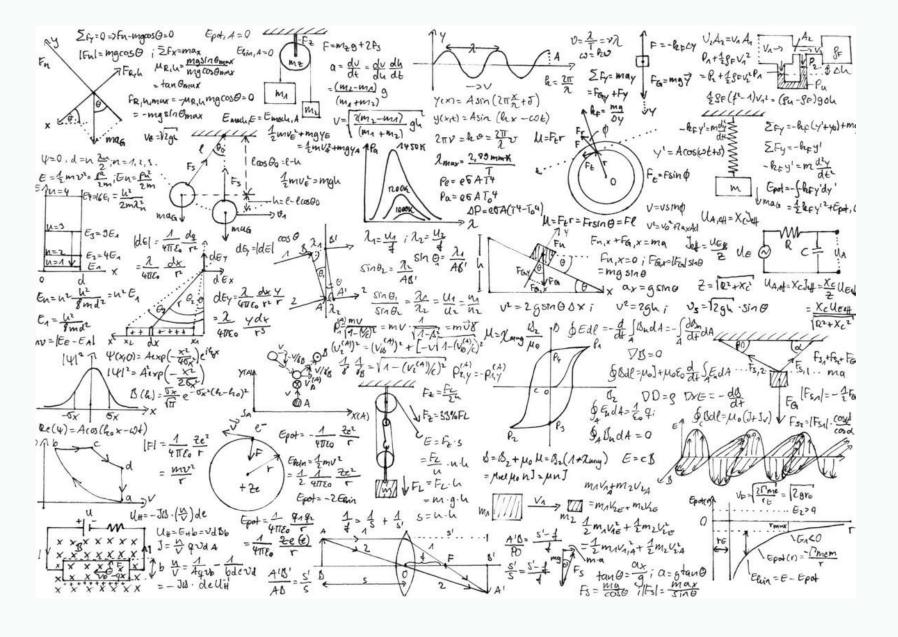


What about Bad Data?





What Is An Algorithm?



An Algorithm...

- Is a finite sequence of well-defined, computer-implementable instructions
- Must always be unambiguous
- Is based on measurable inputs
- Is based on multiple sources of data (Data Warehouse)
- Must terminate in a final ending state
- Can provide automated reasoning
- Based upon math and rules
- Result can feed another algorithm, etc. (loop)
- Depends on good data

What Is An Algorithm?



Machine Learning...

- Uses algorithms and statistical models to perform a specific task without using explicit instructions
- Uses data patterns and inferences instead
- Algorithms build a mathematical model based on sample data, known as "training data"
- Can make predictions or decisions without being explicitly programmed to perform the task
- Uses mathematical optimization as part of the method



Machine Learning...

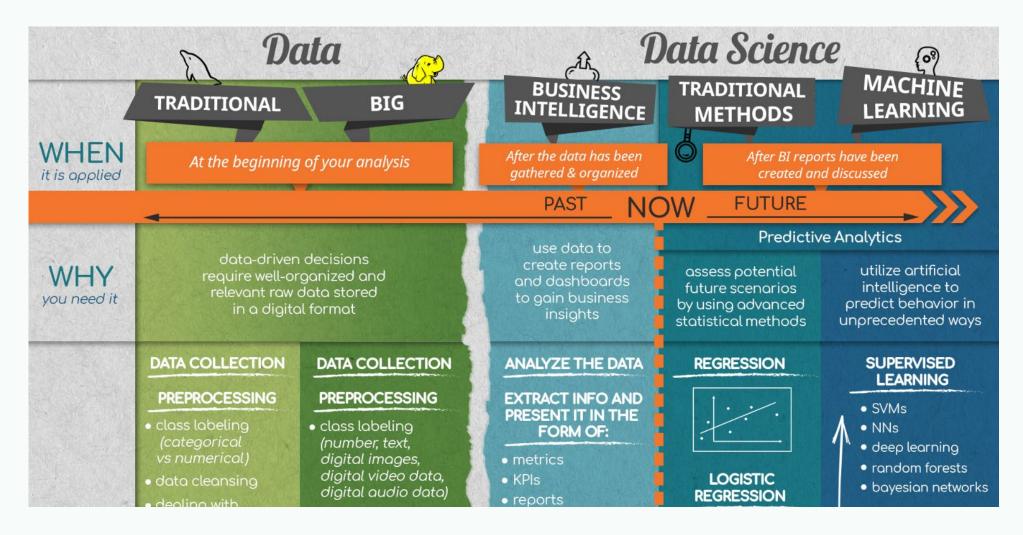
- Algorithms are used in a wide variety of applications, such as email filtering and computer vision, where it is difficult or infeasible to develop a conventional algorithm for effectively performing the task
- In supervised learning, the algorithm builds a mathematical model from a set of data that contains both the inputs and the desired outputs
- In unsupervised learning, the algorithm builds a mathematical model from a set of data that contains only inputs and no desired output labels



Why What Where How

Historical Focus

Forward looking Predictors



unified trust

Source: 365 Data Science 40 (S)

Why You Need It



PHASE ONE

Data Warehouse



Data driven decisions require wellorganized and relevant raw data stored in a digital format



PHASE TWO

Business Intelligence



Use data to create reports and dashboards to gain business insights



PHASE THREE

Predictive Analytics:Data Science & Machine Learning



Assess potential future scenarios by using advanced statistical methods



Utilize artificial intelligence to predict behavior in unprecedented ways



What Techniques are Used



PHASE ONE

Data Warehouse



Data Collection



Preprocessing

- Class labeling (categorical vs numerical)
- Data cleansing
- Dealing with missing values



Case Specific

· Balancing and shuffling datasets



PHASE TWO

Business Intelligence



Analyze data



Extract Info and present it in the form of:

- Metrics
- KPI
- Reports
- Dashboards



PHASE THREE

Predictive Analytics: Data Science & Machine Learning



Regression



Logical Regression



Clustering



Factor Analysis



Time Series



Supervised Learning

- SVMs
- NNs
- Deep learning
- Random forests
- Bayesian networks



Unsupervised Learning

- K-means
- Deep learning



Reinforcement Learning





Where It's Used



PHASE ONE

Data Warehouse



Participant Data



Plan Data



PHASE TWO

Business Intelligence



Sales Optimization reports



Reconciliation reports



PHASE THREE

Predictive Analytics:Data Science & Machine Learning



Compliance detection



Client retention



How: Using What Tools?



PHASE ONE

Data Warehouse



Azure



SQL

SSIS





PHASE TWO

Business Intelligence



SQL



Power BI



PHASE THREE

Predictive Analytics: Data Science & Machine Learning







R / Python





Who is Doing It



PHASE ONE

Data Warehouse

- Data Architect
- Database Administrator
- SSIS/BI Developer



PHASE TWO

Business Intelligence

- Data Analyst
- Power Users in Business



PHASE THREE

Predictive Analytics:Data Science & Machine Learning

Data Scientists



Intelligent Automation

Applications of intelligent automation include broad activities that generate large amounts of data, like fraud screening, account management or sales forecasting.

Business process management (BPM) software is the basis of most current process automation activities.

BPM enables organizations to model processes and use computers to orchestrate these processes by directing workflows according to set process models.

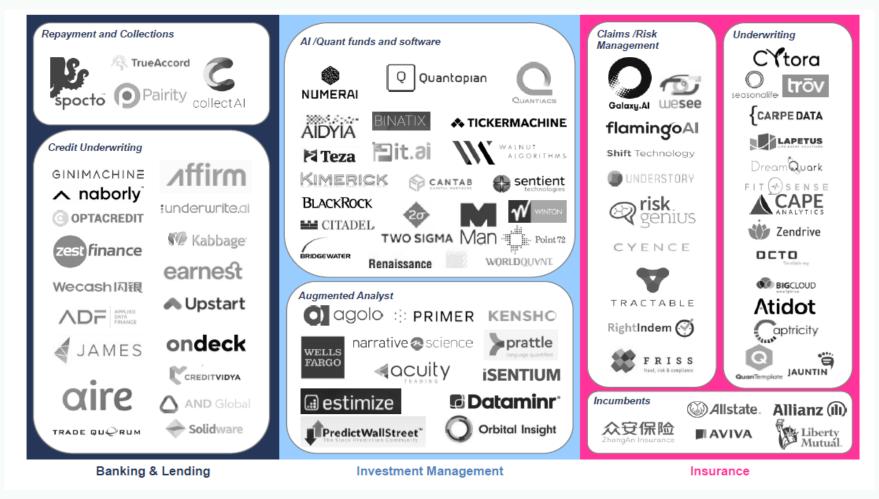


Data, Data!!

- Artificial Intelligence cannot be built without large, open, live structured data sets
- As products are provided in **real time**, compliance functions and risk management must shift from a batch process approach that tests samples of clients to an "always-on" approach for every transaction



Al Market in Financial Management





Not Everything Will Be Good

Social Credit

China's dystopian citizen surveillance mechanism



China is testing a Social Credit System

–a government initiative using an
individual citizen's social, financial and
personal data to build a score which
determines access to a multitude of
public and private goods and services

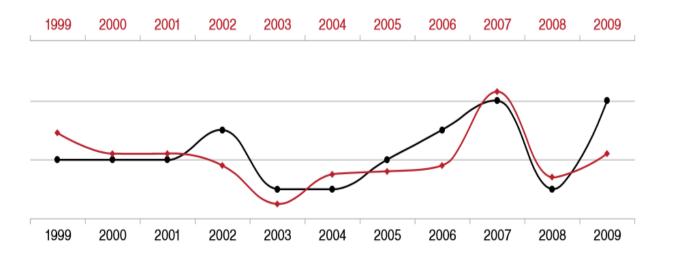




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Correlation? Causation?



Correlation is Not Always Causation

Number of people who drowned by falling into a pool

correlates with

Films Nicolas Cage appeared in

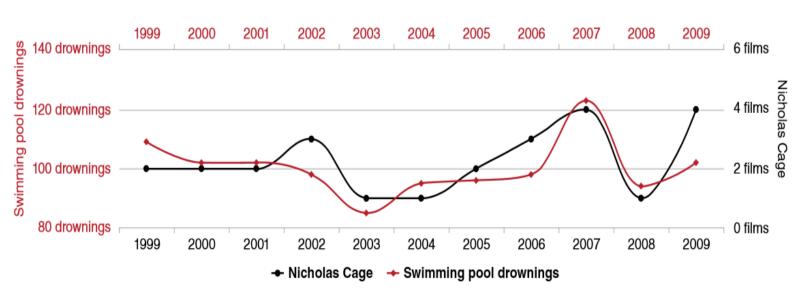


Figure 8.1 Nicolas Cage films are no more responsible for drownings than ice cream. And yet... *Source: tyiervigen.com*



Understanding Big Fiduciary Data

It is there but how do I find it and use it?

BIG DATA





QA and Testing



Personalized Data

The industry has offered distinct homepages and account-specific dashboards, along with increased dashboard or homepage retirement readiness content and the integration of more personalized communication strategies. **Transforming Big Fiduciary Data**

Advisors are still using workflow processes as if they were managing a single account pooled profit-sharing plan.

Today, the data pool is nearly a billion times larger for that one plan!

	Data Elements	Total Data Pool
Single Pooled Account Plan	20	20
250 Plan Participants	250	5,000
CEFEX Fiduciary Best Practices	85	425,000
Outcomes Based Analysis	125	53,125,000
Real Time Daily Compliance	365	19,390,625,000

Kasten, G. "The UnifiedPlan® Dramatically Increases Retirement Success," 2016 c Unified Trust Company



Predictive Data Analytics

- Understand customers better than ever
- Using powerful AI and machine learning, a company can anticipate and address their customers' unspoken needs at just the right moment
- Grow customer lifetime value
- Example: well planned transition from accumulation to distribution phase

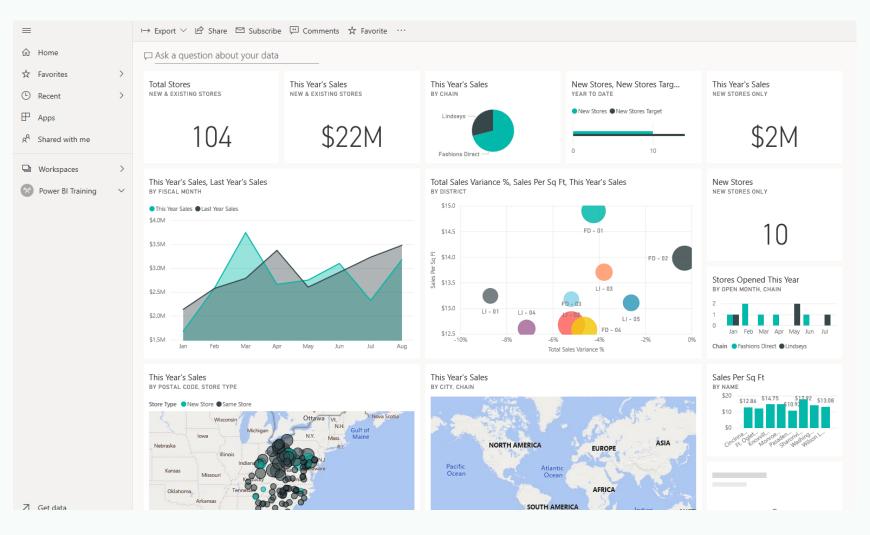
Predictive Data Analytics

- Get a single view of the customer
- Bring together all permissible customer data, regardless of source
- Example: develop a better predictor of client dissatisfaction and likelihood of RFP and account termination

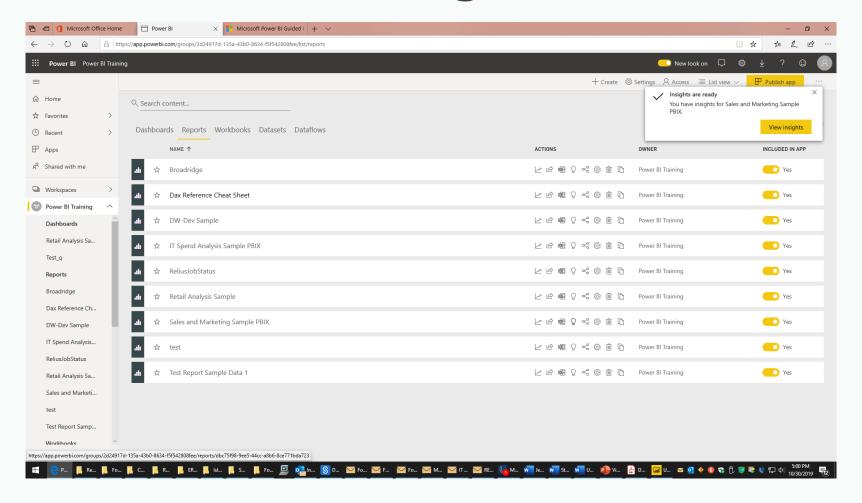


Power BI Advisor Reporting

Ask a Question About Your Data

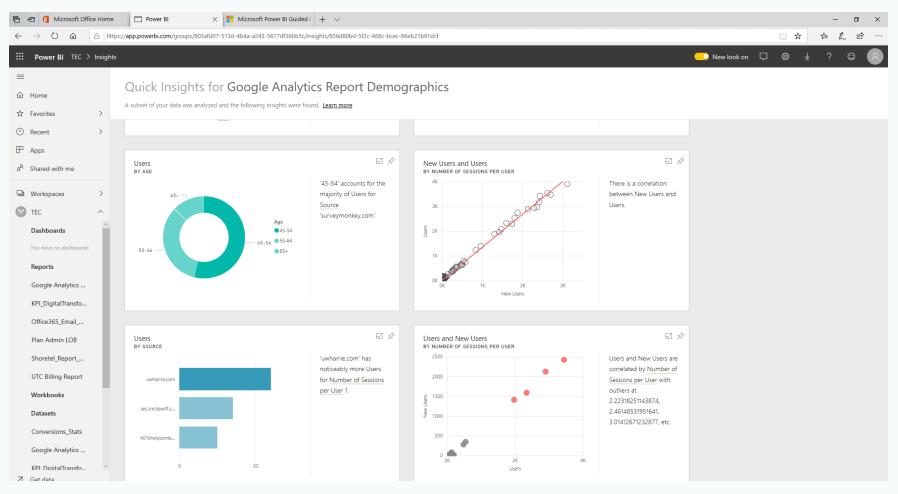


Power BI-Automated Insights





Power BI-Automated Insights

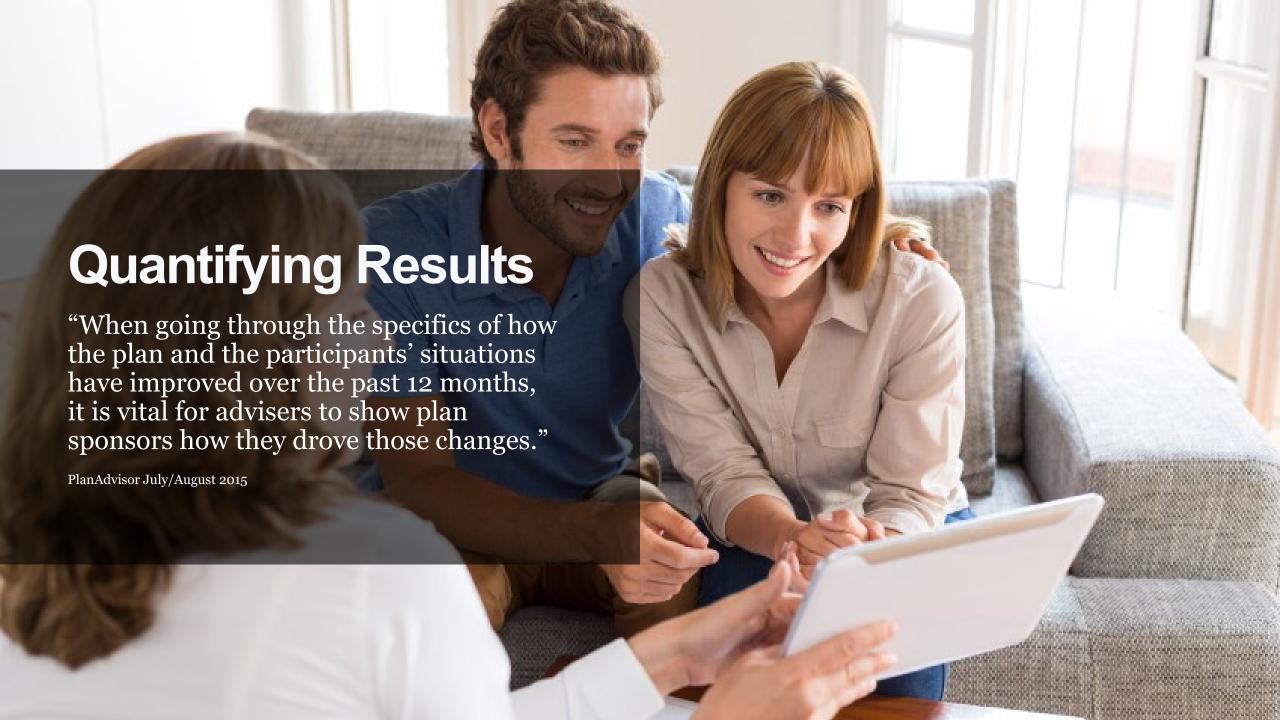














It Is Really Just Four Questions

Be able to answer them.

- 1. Is the participant in the right answer?
- 2. Are they in the correct portfolio?
- 3. Are their fees reasonable in light of services provided?
- 4. Have their outcomes improved?

Most Participants Can Be on Track for a Fully Funded Retirement Benefit



Artificial Intelligence Fiduciary

The participant, the plan sponsor and the plan advisor BENEFIT

- **The Participant:** They have the answer! A retirement goal and a plan that's easy and doesn't require them to change their behavior.
- **The Plan Sponsor:** They have a plan that has improved employee satisfaction and retention while at the same time reduced their fiduciary risk.
- **The Plan Advisor:** You now have a scalable and deliverable service model that drives quantifiable results.

Improving the UX

RESOURCES / PUBLICATIONS

DOL Modernizes Disclosure Rules in a Significant Expansion of Electronic Delivery

in Share

PUBLISHED

October 28, 2019

SOURCE

Groom Benefits Brief

ATTORNEYS & PROFESSIONALS

Michael Del Conte

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Ellen Goodwin

Stephen Saxon

On October 23, 2019, the Department of Labor ("DOL") proposed a new electronic disclosure safe harbor. The proposed rule, "Default Electronic Disclosure by Employee Pension Benefit Plans under ERISA" ("Proposed Rule"),[1] provides an additional safe harbor for the furnishing of pension plan information and disclosures to participants, beneficiaries and alternative payees. The proposed safe harbor could lead to a dramatic expansion in the use of electronic media to furnish retirement plan communications as well as significant financial savings for plans. For now, welfare plan disclosures (e.g., COBRA Notices and notices of adverse benefit determinations for group health and disability plans) are excluded from the Proposed Rule, leaving plan sponsors in the awkward position of having to comply with different disclosure rules for different plans. The comment period is short; comments must be submitted no later than November 22nd.

If finalized, the Proposed Rule could lead to a dramatic expansion in the use of electronic media to furnish retirement plan communications as well as significant financial savings for plans. However, the Proposed Rule was not entirely plan sponsor friendly. DOL limited the new safe harbor to retirement plan documents and information stating that "as proposed, [the safe harbor] does not apply to employee welfare benefit plans, as defined in section 3(1) of ERISA." Rather DOL is still reviewing the impact that electronic disclosure could have on welfare plan disclosures and has indicated it may propose a separate rulemaking for those plans. Additionally, the Proposed Rule would supersede the widely used "continuous access website" rule for pension benefit statement information from Field Assistance Bulletin 2006-03 ("FAB 2006-03"), likely resulting in fewer participants receiving their pension benefit statements electronically. DOL also eliminated a key rule for QDIA notices — the ability to rely on either one of the DOL or the IRS electronic delivery rules. Finally, the Proposed Rule leaves open a number of questions including whether and when certain notices and documents can be removed from a plan's website



Complete Fiduciary

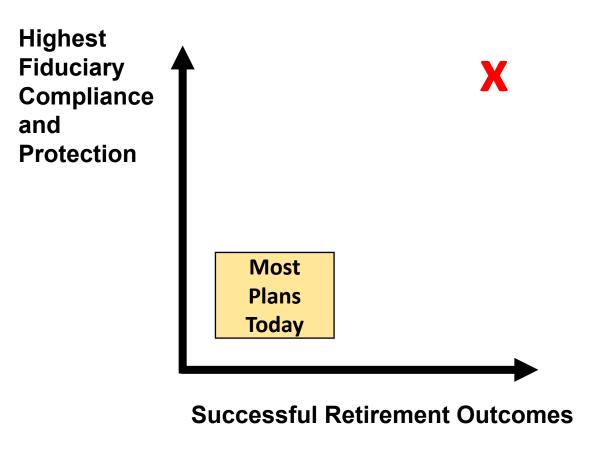
Digital Advice
+ Digital Fiduciary

Success

Always remember

"It is hereby declared to be policy...to protect the interests of participants in employee benefit plans and their beneficiaries..."

Move plan sponsors to the best quadrant



Questions?

Thanks for Joining Us!

Gregory W. Kasten, MD, MBA, CFP®, CPC, AIFA®

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Disclosures

- 1. Introducing the UnifiedPlan®: The UnifiedPlan® is a reporting tool designed to help individual investors understand whether they are on course to achieve a successful retirement. For individual investors who are planning for their own retirement, the tool helps estimate the annual savings required by the individual in order to meet their personal retirement spending goals and provides the individual investor with alternatives such as delaying their retirement or lowering their personal retirement spending for investors who may not be able to save the requisite amount. For investors who are already retired, the tool helps assess whether their portfolio will be able to sustain their desired spending throughout their retirement. The UnifiedPlan® tool uses a deterministic probability simulation that considers factors such as individual investor's saving and spending levels, Unified Trust Company's ("UTC's") long-term market expectations associated with the risk profile selected by the individual investor, the investor's pre- and in-retirement time horizons, and other sources of outside personal income.
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- Mutual Fund Investments: Mutual funds are not bank deposits or obligations, are not guaranteed by any bank, and are not insured or guaranteed by the FDIC. The Federal Reserve Board, or any other government agency. Mutual fund investments involve risk, including possible decline and/or loss of principal. Mutual fund investment performance quoted reflects past investment performance and is not indicative nor can it predict or guarantee future investment results. Investment return and principal value will fluctuate so that an investor's shares, when redeemed, may be worth more or less than their original cost. Performance figures represent an investment made at the beginning of the reporting period. Results for investments made during the report period will differ. UTC obtains performance data information from sources UTC believes to be reliable, but UTC cannot guarantee the data's completeness and/or accuracy.



Disclosures

Limitations Associated with the UnifiedPlan®: The UnifiedPlan® tool's limitations include, but are not limited to the large number of assumptions UTC must make in its analysis for the investor. The accuracy of UTC's assumptions directly impacts the quality of the UnifiedPlan® tool's assessment provided to the individual investor. Potential known problems and/or deficiencies of the UnifiedPlan® tool presently include, but are not limited to, UTC's use of the investor's personal financial data provided to UTC which may later prove to be inaccurate or incomplete, the investor's selection of a risk tolerance that does not represent how the investor's portfolio is actually invested, the investor's long term market expectations of risk, return, and inflation that are not achieved in the modeled time frame, UTC's inclusion of the investor's future personal income in UTC's analysis that is never received by the investor, and unforeseen personal life emergencies that require decreased personal saving before the investor's retirement, the investor being forced to retire earlier than originally planned, or the investor's increased spending needs during their retirement. Differences will likely exist between prospective and actual investment results because events and circumstances frequently do not occur as expected, and those differences may be material in the investment outcome, particularly because investment performance estimates are made over extended time periods. All projected figures and investment performance data are reflected in current (inflation adjusted) pre-tax dollars, as of the date of the investor's enrollment in the plan and initial use of the UnifiedPlan® tool. The estimated inflation rate used in this analysis is based upon a capital market forecast developed by UTC.

Certain participant circumstances may have a material impact on individual retirement projections and on actions that the UnifiedPlan initiates with respect to your (the participant's) account. Such circumstances could include, without limitation, deferral rates that are not constant throughout the year, and/or annual historical compensation figures that have varied materially, inconsistency of the timing or amounts of compensation, information regarding personal investments, additional income or other personal circumstances supplementing the information above or affecting the above

- analysis. In addition, the actual Social Security benefit received in retirement may be different from the estimated value used for projections. Such circumstances should be communicated to and discussed with your Plan advisor or Unified Trust Company.
- Investor/Participant Success is Not Guaranteed: The UnifiedPlan® tool's portfolio changes for each participant are governed by the Plan Document, the Benefit Policy Statement and the Investment Policy Statement for the investor's own Plan. Investor/Participant success is the Plan's primary goal but is not guaranteed. UTC is a professional, independent fiduciary focused on managing retirement plans for the benefit of participants and beneficiaries, with a focus on achieving the highest possible rates of participant success. But, ultimately, success depends upon the decisions and abilities/capabilities of each investor/participant and other factors beyond the control of both investors/participants and fiduciaries, including UTC. As a result, the investor/participant's investment success is not and cannot be assured and/or guaranteed by UTC. Neither the Plan Sponsor nor UTC guarantees that any participant will achieve a successful retirement.



Disclosures

- 6. IMPORTANT: The projections or other information generated by the UnifiedPlan® tool regarding the likelihood of various investment outcomes are hypothetical in nature, do not reflect actual investment results, and are not guarantees of future results. Projected growth of assets is based upon UTC's projected future modeled returns and the asset allocations of the investor's portfolio for the investor's goals. The graphical representations are an approximation derived from the pertinent events and assumptions tied to the investor's goal. Please note that indices are not managed, indices do not incur management fees or expenses, and investors cannot make direct investments in indices. UTC bases risk assessments upon both Modern Portfolio Theory ("MPT" standard deviation risk) and Post Modern Portfolio Theory ("PMPT" downside deviation risk).
- Investment Diversification: UTC believes that a well-balanced and diversified investment portfolio will help achieve an investor's long-term retirement security. As such, UTC feels the investor should give careful consideration to the benefits of a well-balanced and diversified investment portfolio. UTC believes that spreading an investor's assets among different types of investments can help the investor achieve a favorable rate of return, while minimizing the investor's overall risk of losing money. Consequently, UTC believes that certain market or other economic conditions that cause one category of assets, or one particular security, to perform very well can likewise cause another asset category, or another particular security, to perform poorly. If you invest more than 20% of your retirement savings in any one company or industry, your savings may not be properly diversified. Although diversification is not a guarantee against loss, UTC believes diversification is an effective strategy which helps the investor manage investment risk. In deciding how to invest retirement savings, UTC believes the investor should take into account all of the individual's personal assets, including any retirement savings held outside of the Plan. UTC believes that no single approach is right for all investors because, among other factors, individual investors have different financial goals, different time horizons for meeting their goals, and different tolerances for risk. UTC also believes that it is important for the investor to periodically review their own investment portfolio,

personal investment objectives, and the investment options available under the Plan to try to ensure that the investor's retirement savings will meet their personal retirement goals. For more information regarding individual investing and diversification, please visit the Department of Labor's website at www.dol.gov/ebsa/investing.html.

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