White paper:

Using artificial intelligence to power the retirement savings plan of the future

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Who Should Read this White Paper and Why?

Trustees, plan sponsors and other responsible parties associated with oversight for retirement savings plans seeking to understand how innovation-and specifically artificial intelligence (AI) - can be used to improve plan design, increase participant engagement and enhance retirement outcomes.

This paper aims to:

- inform about technology advances within the field of AI, and how they can be applied to improve retirement savings plan design and participant engagement;

- explain how incorporating AI elements into retirement plans, can improve the participant experience, bringing a higher level of customization and overall satisfaction; and

- offer guidance on navigating potential enhancements to retirement savings plans harnessing the power of AI.

Introduction

Artificial intelligence (AI) now permeates our daily lives, from personalized online shopping algorithms to crowd-sourced navigation assistance. It is all around us, making our daily customer experiences more personalized and our lives a bit less frustrating, and its proven value is now being applied to employer-based retirement savings programs on a global scale. AI is increasingly influencing the structure and delivery of retirement savings plans by providing plan sponsors and trustees with better tools and information for monitoring portfolio managers and giving plan participants a richer and more customized user experience. While AI faces many of the same adoption hurdles that other revolutionary technologies confronted, its transformative properties in other industries leave little question that it will play an increasingly significant role in retirement savings programs around the world over the coming years.

Financial decision-making in retirement savings plans

When it comes to making decisions in general, we all share common human patterns of behavior, tendencies and biases. At the same time, each of us also has qualities and behaviors that make us unique. These similarities and differences are never more evident than when it comes to making decisions about our finances. For many people, their relationship with money and finances can be fraught with fear, apprehension and confusion while for others it brings a sense of fulfillment, happiness and freedom. Depending on their design and operation, retirement savings plans, such as defined contribution[1] plans in the US, can reinforce these positive or negative attitudes, thereby increasing or decreasing participant engagement.

For most people, saving for retirement is the most important sequence of financial decision-making processes and actions in their lifetime. Saving enough (or not) can mean the difference between actually pursuing dreams years in the making or them staying just that, dreams. Fortunately, the rise of personal retirement savings plans and the associated shift in responsibility to the individuals have been accompanied by advances to help those individuals make better financial decisions and mitigate the associated anxiety.

The relatively recent field of behavioral economics has had a remarkable influence on financial decision-making within retirement savings plans around the world, helping guide people towards higher financial security through better savings behaviors. Several countries have addressed one such bias identified in behavioral economics research– individuals' tendency to choose instant satisfaction over delayed gratification–b y incorporating auto-enrollment and auto-escalation into retirement plan design. New employees are automatically enrolled into a company's retirement savings plan and then automatically receive a contribution rate increase, up to a maximum, each subsequent year. Since the premise for and the power behind behavioral economics is rooted in "universal" behavioral flaws, corresponding solutions such as these and the benefits they produce are broadly applicable. However, any instrument so general is going to be a bit blunt, lacking personalization.

If we consider retirement savings programs around the world utilizing behavioral economics principles in plan design, the "yang and yin" are fairly evident. To the yang, the core behavioral economics tenet that people "go with the flow" and defer making decisions has made auto-default options a boon to retirement savings. To the yin, the "auto-pilot" approach can have unintended negative consequences such as creating a generation of less engaged and informed investors, especially for younger, lower paid and shorter-tenured employees, thereby increasing pressure to improve financial literacy levels. Employees less engaged in the workplace, including on issues related to their pension, can also create workforce management and succession challenges for the employer.

The challenge and opportunity facing plan sponsors today is how to use advances in AI technology to augment the foundation provided by participants and behavioral finance so that retirement savings plans deliver even higher performance for those entrusted with oversight responsibilities.

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1 For purposes of this paper, the term defined contribution (DC) plan refers to a retirement savings program in which individuals are fully or partially responsible for setting aside a portion of their salary for retirement through an employer- or industry-based offering.

Artificial intelligence and retirement savings plans

AI can mean different things to different people but for present purposes we will focus on mining data, identifying patterns in behavior based on that data and developing responses that can improve the user experience and decision-making abilities for retirement plan sponsors, trustees and participants. One conventional example would be the "chatbot", which enables plan participants to hold an on-line conversation with a support "person"– in reality an AI-aided computer, although many assume it's a human being–t o receive information and help to navigate a particular issue.

Behind the scenes an important distinction is taking place. The source and relevance of the data underlying the AI-based communication can vary from broad based to highly personalized. In the context of a retirement savings plan, the sourced data can be categorized across three levels of personalization and effectiveness:

Depth and complexity of data sources

Level 1	Level 2	Level 3
Highly generic sourced data and information to answer questions transcending the plan. For example, answering general questions about tax regulations related to withdrawing retirement assets.	Plan-specific information forms the basis for AI interactions, whether relating to plan design or overall participant profiles. For example, information about how plan participants can take a loan using retirement funds as collateral (for plans offering this option.) Or, for the plan sponsor, AI-based assessment tools to monitor portfolio managers' adherence to their investment mandates.	The most advanced application of AI would utilize individual plan participant information including investments, plan participant age, savings rate and retirement asset goals, to prompt highly personalized interactions and decisions such as presenting optimal withdrawal rate information based on the participant's specific circumstances.

Expert sidebar: Dream Forward's "Confusion index"

Dream Forward is a US-based provider of 401(k) and 403(b) retirement plans that incorporates AI into the design and delivery of their plan participant chatbot. The chatbot integrates general retirement (level 1) and plan-specific (level 2) information into an on-line digital portal plan that participants can access 24/7. The decision tree methodology backing the plan participant communications takes into account not only word-matching but contextual clues to design the most appropriate responses and guidance. A "Confusion Index" highlights for the plan sponsor those topics most frustrating participants and causing disengagement. This type of sentiment analysis can be instructive for plan sponsors and assist them in reassessing and revising multiple aspects of a plan's design from communications to investment offerings.

AI can bring value to not only the participant engagement process but also three other key building blocks of a well-designed, delivered and monitored retirement savings plan: plan design, plan governance and investment strategy.

AI application to four building blocks of a retirement savings plan
Below we briefly address each of the four building blocks and how AI capabilities can be used to enhance each of them.

Four retirement savings plan building blocks

Plan design	■ In an ideal world the retirement savings plan structure perfectly meets all plan objectives, delivering 100% participation in the appropriate risk-adjusted investments at savings levels that will maintain an employee's standard of living through retirement. ■ Even taking into account the insights offered by behavioral economics, plan sponsors can often fall short of this goal. Capturing and analyzing information underpinning plan design weaknesses at both a generic and a personalized level can translate into improved results. ■ For example, examining the profiles and actions associated with participants taking advantage of the corporate savings match can lead to design adjustments that better serve participants' long-term interests.
Participant engagement	■ We know that without participant engagement, the best behaviors and results for the plan participant are hard to achieve. Plan communications and delivery methods must resonate with participants; otherwise, emails or texts will be quickly ushered to the trash bin icon. ■ The most common AI-related participant engagement tool is the chatbot. Chatbots are a means for consumers to interact, ask questions and get personalized feedback from a computer based on available data. Amazon's Alexa is one well-known example. Offering positive reinforcement for actions that strengthen financial security and persuasive communications when a poorer decision is being considered are all ways AI can enhance plan participant engagement, encourage informed investment decisions and, ultimately, improve retirement outcomes. AI can enable the chatbot to evolve from a reactive service (e.g., I have a question and need help) to being a proactive device informed and activated by broader participant milestones such as salary raises. ■ Imagine, for example, a participant trying to decide between two different investment strategies. A chatbot or educational primer explaining the trade-offs and risks of the two options based on data collected on the participant's personal goals could be highly influential towards a positive outcome.

Plan governance	■ A core component of strong plan governance is the plan sponsor's/trustee's ability to fully execute their fiduciary obligations. This requires aligning plan guidelines and objectives as closely as possible with the employee population, refining over time based on actual data collection and analysis. ■ AI technologies empower plan fiduciaries to take more proactive steps to fulfill their obligations. For example, participants experiencing a positive relationship with their retirement savings plan may be more likely to remain with the plan after leaving the company or retiring. Maintaining a larger participant pool, in turn, helps, the plan sponsor to keep fees low. ■ Plan sponsors can also use AI to better align products and services to participant needs by developing more sophisticated plan participant profiles than would be possible using the basic risk tolerance/"know your client" questionnaires currently used by many plan sponsors.
Investment strategy	■ Increasingly, custom investment strategies such as multi-asset mandates are replacing cookie-cutter offerings. In addition, investment vehicles such as collective investment trusts in the US can offer plan sponsors more flexibility at a lower cost. ■ AI technology can aid sponsors with the on-going design and revision of investment offerings to best reflect each participant's individual profile. For example, a plan sponsor can analyze participant withdrawal data to create target-date offerings that are best suited to the particular needs of their plan's participants. ■ AI has also enabled more sophisticated valuation methodologies for alternative asset classes such as real estate, making it feasible to include them in a daily-traded retirement plan environment and expand diversification options for participants.

Case Study: Government Pension Investment Fund (GPIF) & AI
Japan's Government Pension Investment Fund is the largest retirement fund in the world with approximately $1.5 trillion in assets. In response to concerns about investment performance associated with outside investment managers, the GPIF Board of Governors commissioned a study to explore a proof-of-concept AI system that would enable GPIF to select and monitor fund managers based on daily trading behavior data and analysis. The AI system– a deep learning neural network–de tects and compares investment styles against expected performance and characteristics on a real-time basis based on select trading data such as trading items, timing, volume, unrealized gain and loss. Initial results are promising, giving GPIF stronger capabilities to properly detect investment styles and drifts attributed to the 16 fund managers evaluated. Confirming the proof-of-concept application of AI to the investment management selection and monitoring process sets the stage for GPIF to implement a more institutionalized process in the future.

AI and retirement savings plan assessment framework
The chart below illustrates various scenarios in which a plan sponsor uses different levels of AI and data personalization to address challenges relating to the four retirement plan building blocks.

	Scenario	Data source supporting AI		
		Level 1 "Universal"	**Level 2** "Plan-Specific"	**Level 3** "Participant-Specific"
Plan design	Plan sponsor evaluating the effectiveness of its corporate match program (CMP).	■ Participant has access to an educational library providing generic context and language explaining CMPs. ■ Plan sponsor receives retirement industry statistics on CMPs.	■ In addition to Level 1 features, chatbot explains to participant the specific rules and rationale behind the company's CMP. ■ Plan sponsor is able to review aggregate statistics on plan participants taking advantage the CMP versus the broader plan population.	■ In addition to Level 1 and Level 2 features, outbound communication (via chatbot) to those not or sub-optimally accessing the CMP to encourage participation. ■ Plan sponsor can test different potential CMP structures and communications against one another based on personal data, such as savings rate, salary and age, to prompt a positive response.
Participant engagement	Plan sponsor trying to measure effectiveness of participant communications.	Plan sponsor receives general industry statistics and analysis on efficacy of different types of communication channels and language.	In addition to Level 1 features, plan sponsor collects plan-level communications data on participant access, frequency, and "confusion points" via digital portals.	In addition to Level 1 and Level 2 features, plan sponsor can assess effectiveness of specific "A/B" language testing against participant cohorts via digital portals and call centers.
Plan governance	Plan sponsor wants to adjust participant communications within regulatory constraints.	Plan sponsor receives general statistics on number of participant interactions on-line and overall correspondence.	In addition to Level 1 features, plan sponsor captures information (e.g., frequency, aggregate participant profile) on specific topics and issues raised on-line and resulting actions.	In addition to Level 1 and Level 2 features, plan sponsor considers modifications to communications based on individual participant profile within regulatory and compliance constraints.
Investment strategy	Plan sponsor wishes to evaluate fund utilization by plan participants.	Plan sponsor receives quarterly statistics on asset flows and number of participants.	In addition to Level 1 features, plan sponsor collects monthly fund data on plan-level participant profiles, asset allocation role and fund-by-fund sentiment analysis.	In addition to Level 1 and Level 2 features, plan sponsor sees participant level data, chatbot communications and outbound correspondence to understand broader context associated with each fund selection.

Case study: Re-defined contribution plans 2018 defined contribution language study[2]
Invesco has examined the significant impact that language within participant communications has on connecting (or disconnecting) plan participants to their DC plan and enhancing their decision-making capabilities. The study analyzed not only participant reaction and understanding of different topics but, more importantly, the specific language driving them. The findings highlighted four key attributes–positive, plausible, plain-English and personal–that when weaved into participant communications garnered stronger engagement and increasing levels of trust between participants and plan sponsor. The study showed that simple modifications, such as using risk management language about "staying on track" rather than "managing risk" can meaningfully improve participant engagement and decision making.

Case study: MassMutual brings artificial intelligence to employees
MassMutual has been applying AI across its entire Financial Wellness offering including its 401k platform says Sears Merritt, Head of Technology Strategy, Enterprise Architecture & Data Science. Applying AI has helped plan participants make better decisions about their financial health and at the same time better guide employers in the design and structure of their retirement plans. For example, through extensive "A/B testing" MassMutual discovered that when recommendations for participants were most effective when they incorporate detailed personal financial information such as student loan and mortgage debt levels. While he acknowledges that MassMutual is still early in the process, Merritt sees AI increasingly playing a proactive role in alerting and informing participants before they ask for help.

2 "DC plan Jargon Stymies Participant Success",https://www.planadviser.com/dc-plan-jargon-stymies-participant-success/

Five Steps to an AI-enabled Retirement Savings Plan

As with any consideration of potential modifications to a retirement savings plan, careful evaluation is required. The following five steps provide a good roadmap for plan sponsors evaluating how to employ AI to improve the design and functionality of a retirement savings plan.

Step 1	**What are the plan objectives?** Plan objectives related to plan participant behavioral characteristics most conducive to AI applications could include those related to increasing: ■ Participant engagement and tool interaction ■ Savings contribution rates ■ Confidence level in long-term financial security ■ Financial awareness and literacy
Step 2	**Where are plan objectives currently falling short?** Analyze plan participant action or inaction that may result in sub-optimal results.
Step 3	**What types of information and knowledge, if available, might improve key metrics and outcomes?** Data analysis and participant surveys aligned against gaps in performance such as under-saving and poor asset allocation, combined with insights from a "confusion index" can highlight priority areas.
Step 4	**Where and how do plan participants want to be engaged?** Participants have preferences for where and how they want to interact with the retirement savings plan. Using technology to address those biases can help improve engagement levels.
Step 5	**What type of language best resonates with plan participants?** As highlighted by the Invesco study discussed above, language can dramatically impact plan participant engagement and behavior. Plan sponsors can use AI to conduct sophisticated sentiment analysis and then customize plan communications accordingly to maximize positive participant responses.

These five steps serve as a strong starting point for addressing how and where plan sponsors and trustees can use AI to better fulfill their fiduciary responsibilities to plan participants.

Conclusion

Retirement savings plans putting individuals "in the driver's seat" are proliferating around the globe. Many countries have already taken steps to create processes for participants that apply behavioral economics principles to balance personal engagement with automated decision-making mechanisms. Artificial intelligence– already prevalent in many facets of our daily lives– can be an ideal vehicle to build upon that progress by helping to create a more personalized participant experience than ever before. Doing so can enable better and more dynamic financial decisions by more engaged participants, thereby increasing retirement financial security. It can also empower plan fiduciaries to fulfill their duties more effectively and efficiently and to design plans that ultimately deliver better retirement outcomes for participants.