SOCIETY OF ACTUARIES®

2019 ANNUAL MEETING & EXHIBIT

October 27-30
Toronto, Canada

Session 162: Technology and the Impact to Retirement Consumers in the Future

How Technology is Transforming the Retirement Landscape

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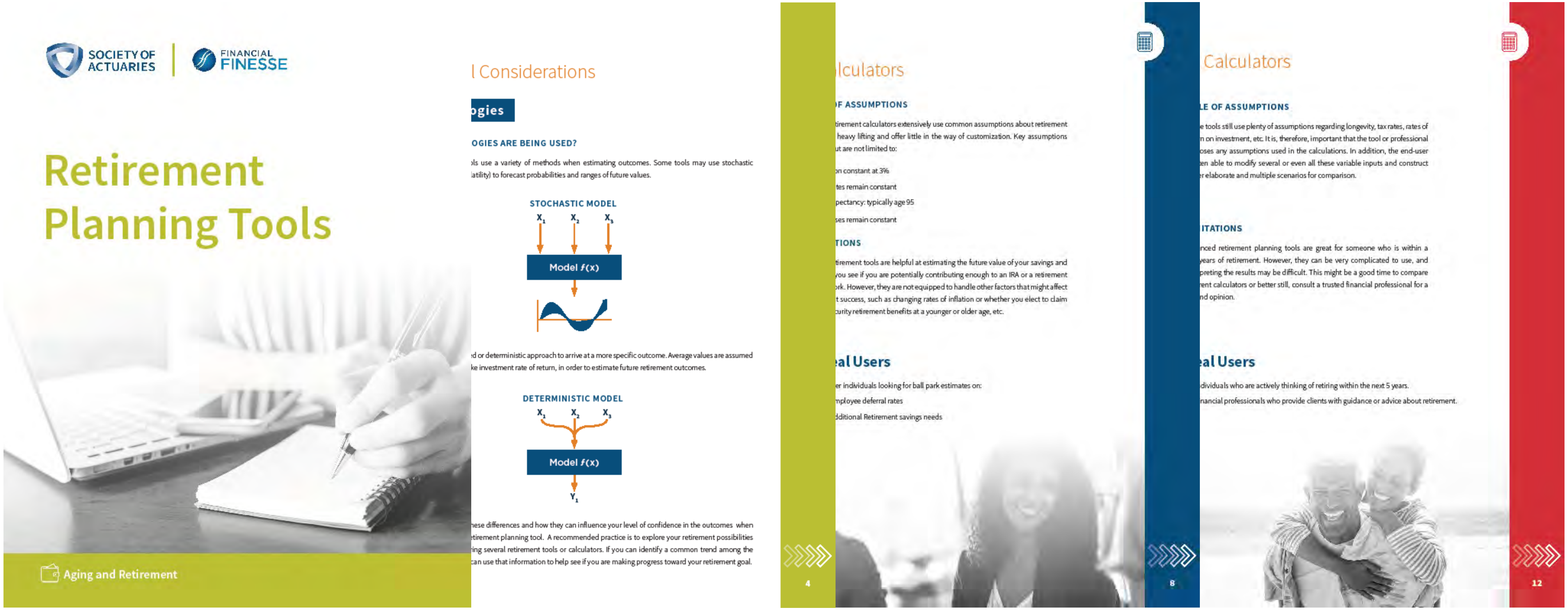
2019 ANNUAL MEETING & EXHIBIT

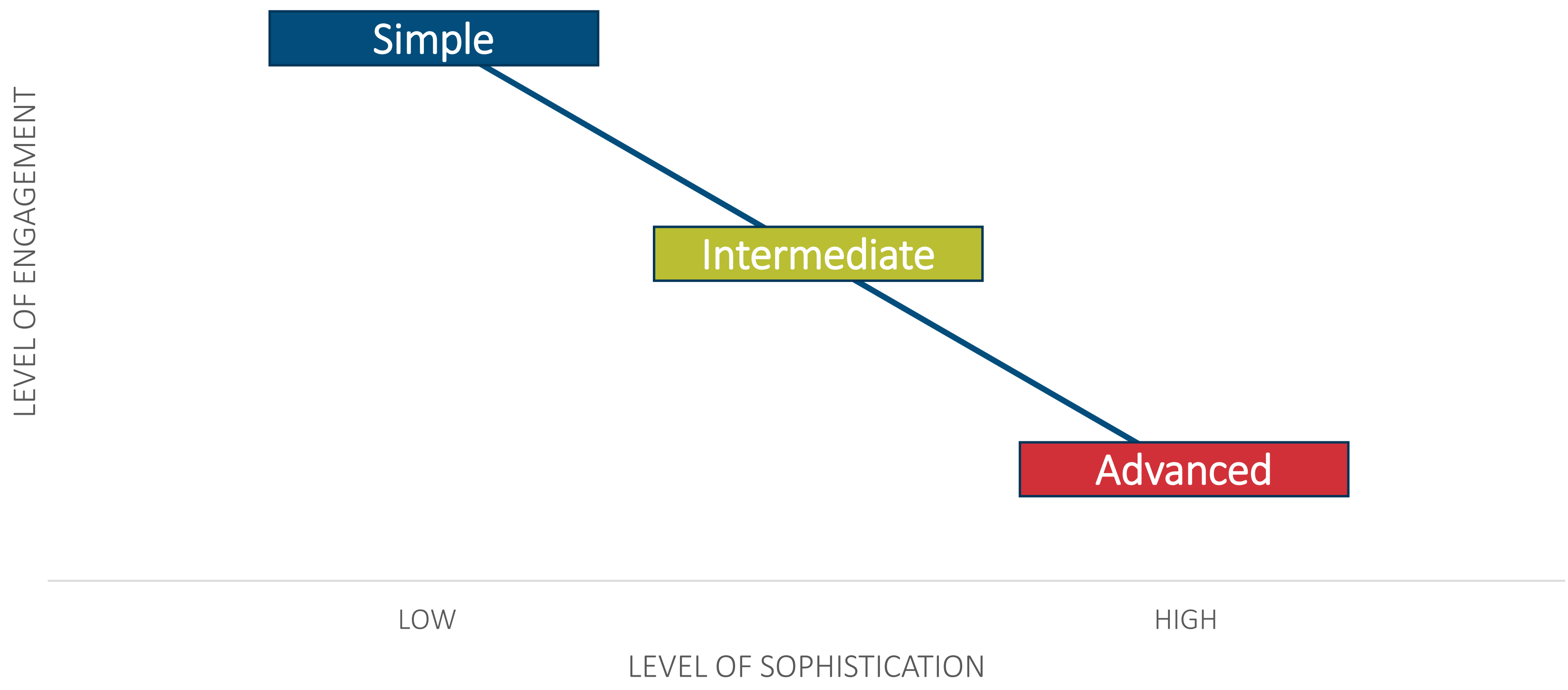
SOCIETY OF ACTUARIES®

Aging & Retirement Strategic Research Program

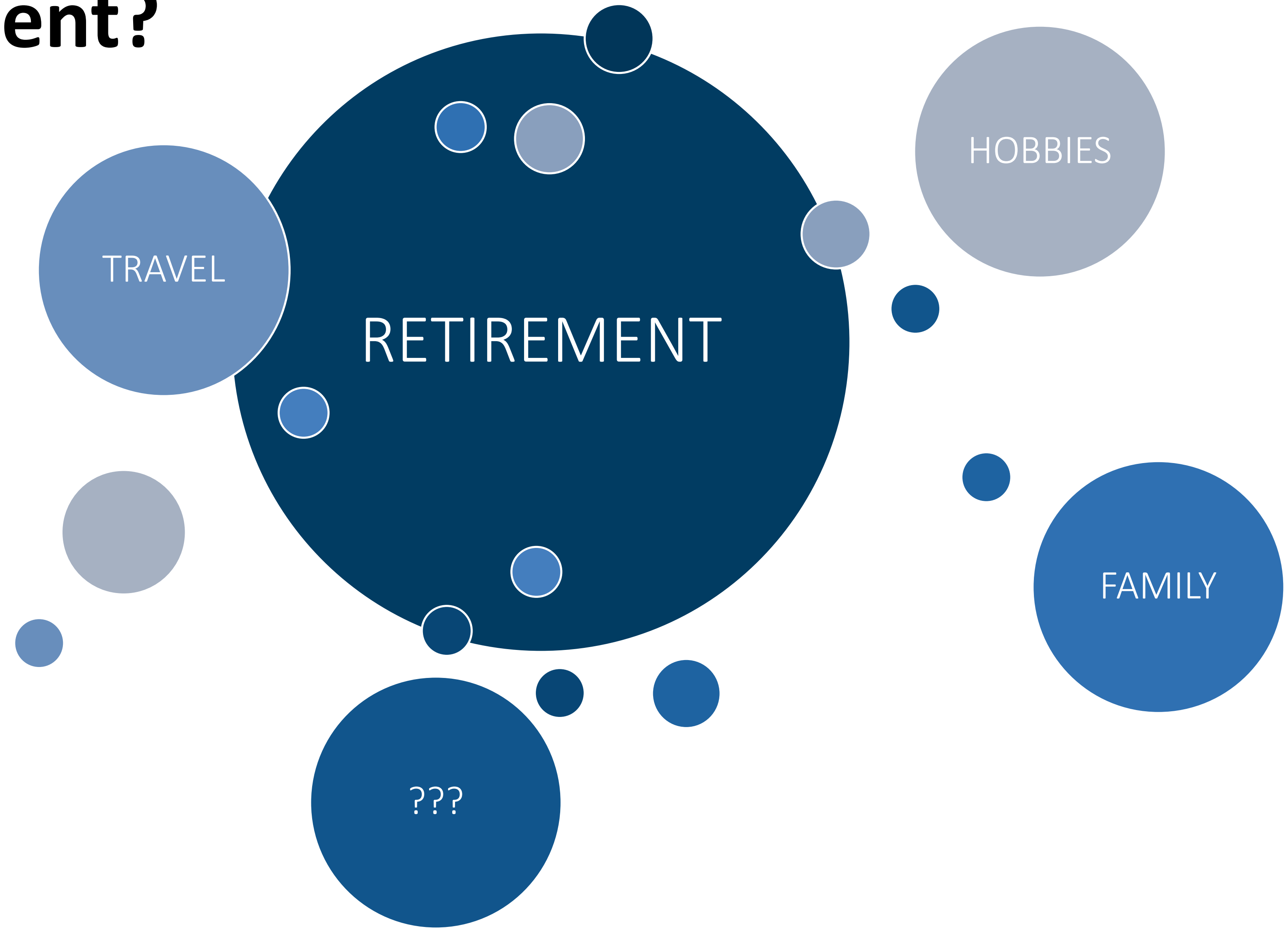
Retirement Planning Tools Guide



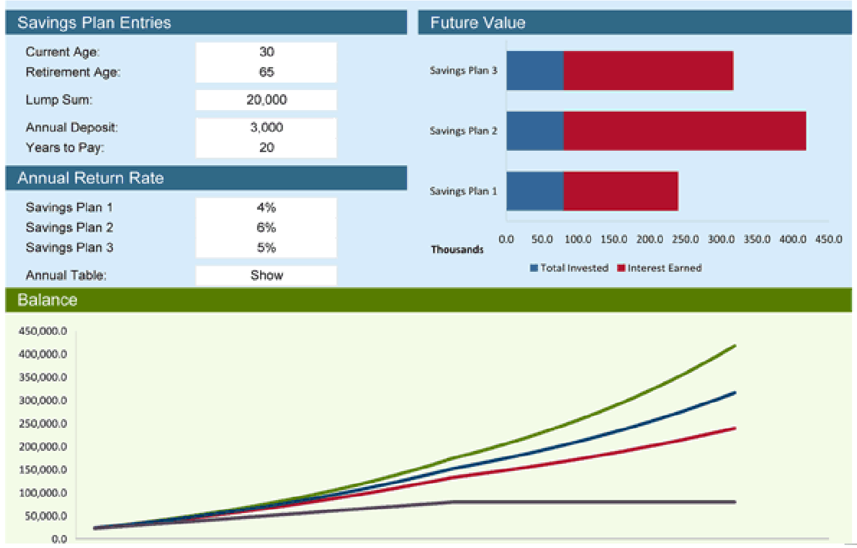
Bigger is not always better



What is retirement?



How do we solve for it?

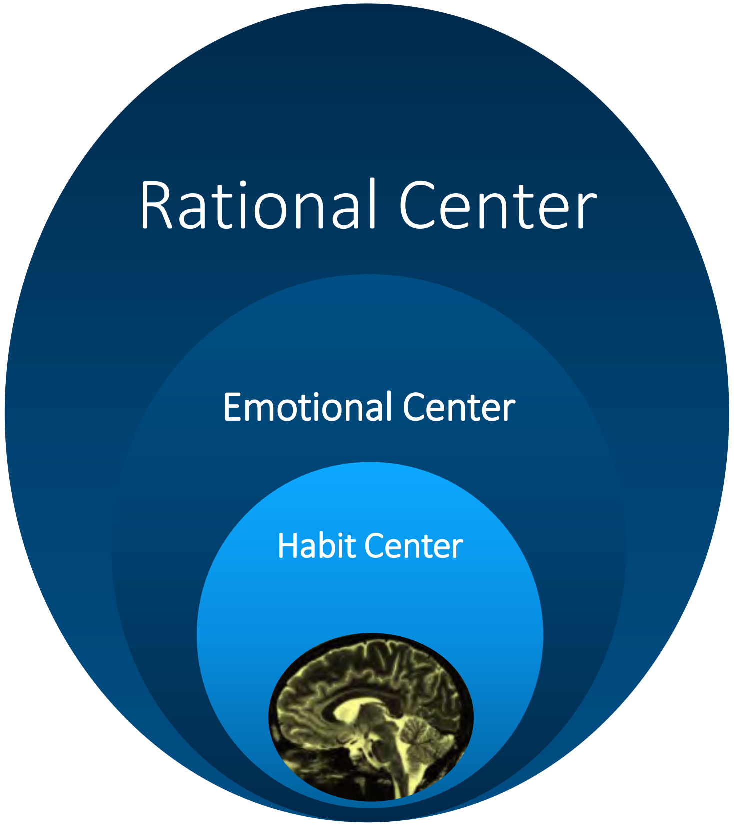


Then → **Now**

Why isn't it working?

For 2019, the EBRI Retirement Security Projection Model® (RSPM) finds that 40.6 percent of all U.S. households where the head of the household is between 35 and 64, inclusive, are projected to run short of money in retirement.[1]

Only 35 percent of participants that have taken a financial wellness assessment in 2019 report being on track for retirement. Nearly half (47 percent) have failed to run a retirement projection.[2]

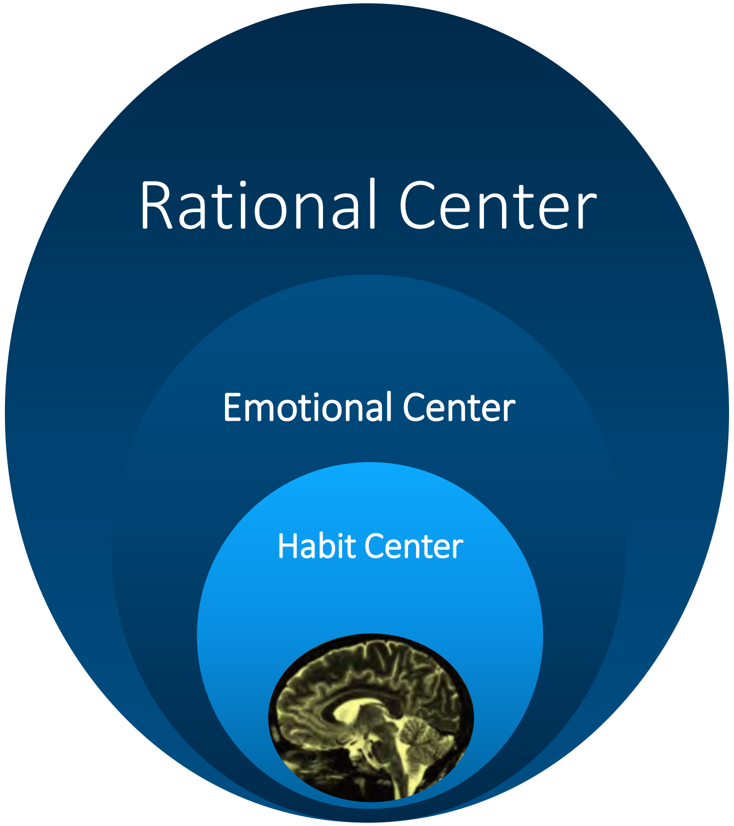


[1]*VanDerhei, Jack, Ph.D., "Retirement Savings Shortfalls: Evidence From EBRI's 2019 Retirement Security Projection Model®," Employee Benefit Research Institute, Issue Brief No. 475, March 7, 2019*
[2]*Unpublished data from Financial Finesse, as of October 1, 2019*

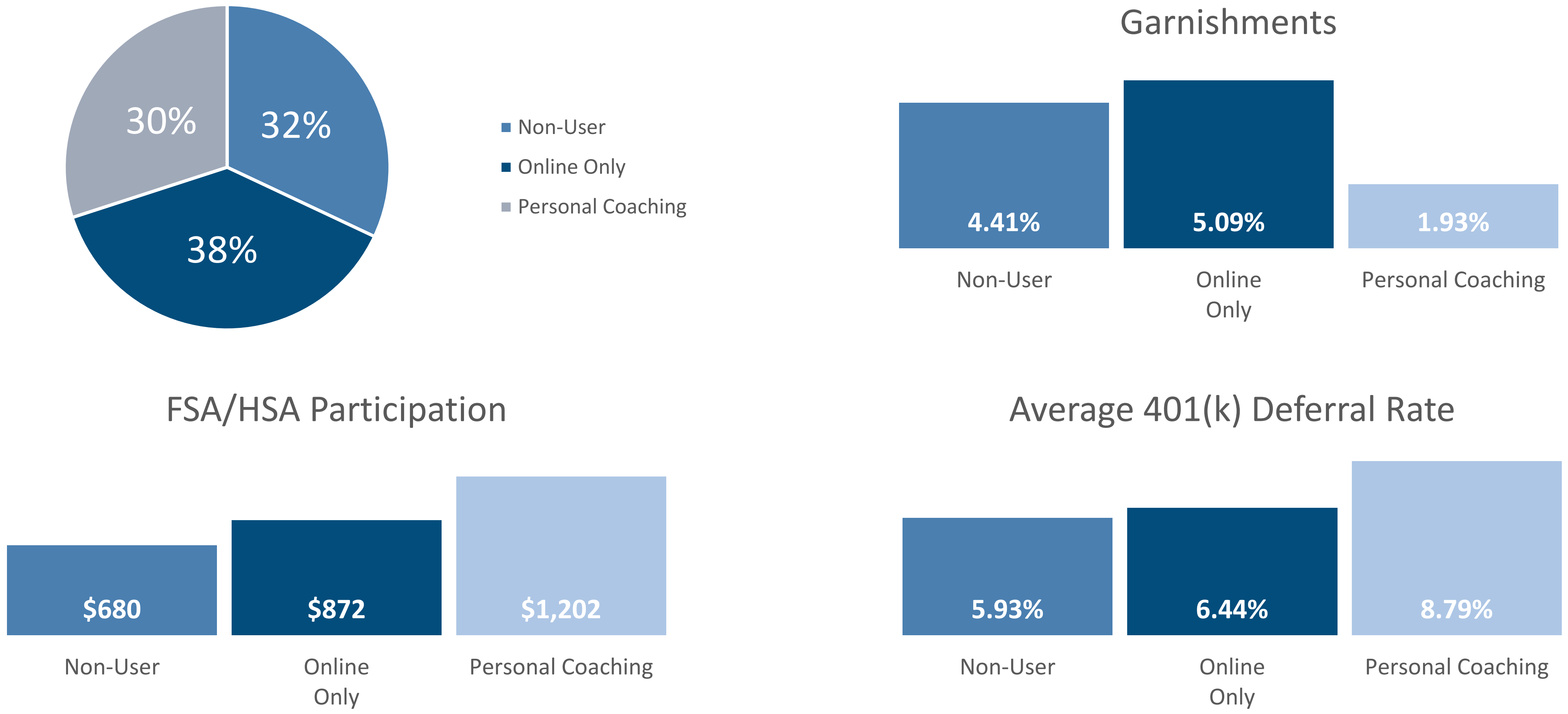
Building a personalized approach to behavior change

The next generation of retirement planning software should…

1. Go beyond the numbers and help users identify the “why” along with the “what” and “how”
2. Recognize what holds users back and look at the big picture to determine what information is needed to make better decisions going forward
3. Deliver interactive and engaging financial guidance in a user’s preferred learning style
4. Provide “quick wins” to motivate users to further action
5. Ensure ongoing support and accountability to ensure positive habits are formed



Technology does not work in a vacuum



Source: Financial Finesse, 2018 case study of Fortune 500 healthcare company

Technology is part of the total user experience

Measuring success through technology

	2013	2018
Average Overall Financial Wellness Score	5.0	6.4
I have a handle on my cash flow	67%	80%
I have an emergency fund to cover unexpected expenses	51%	60%
I pay my bills on time each month	86%	93%
I'm comfortable with the amount of debt I have	58%	67%
I regularly pay off my credit card balances in full	52%	61%
I feel confident my investments are allocated appropriately	43%	69%
I am on track to reach my income goal in retirement	21%	57%
Average Retirement Plan Contribution Rate	6.3%	9.4%
Average HSA Contribution Amount	$934	$1,319

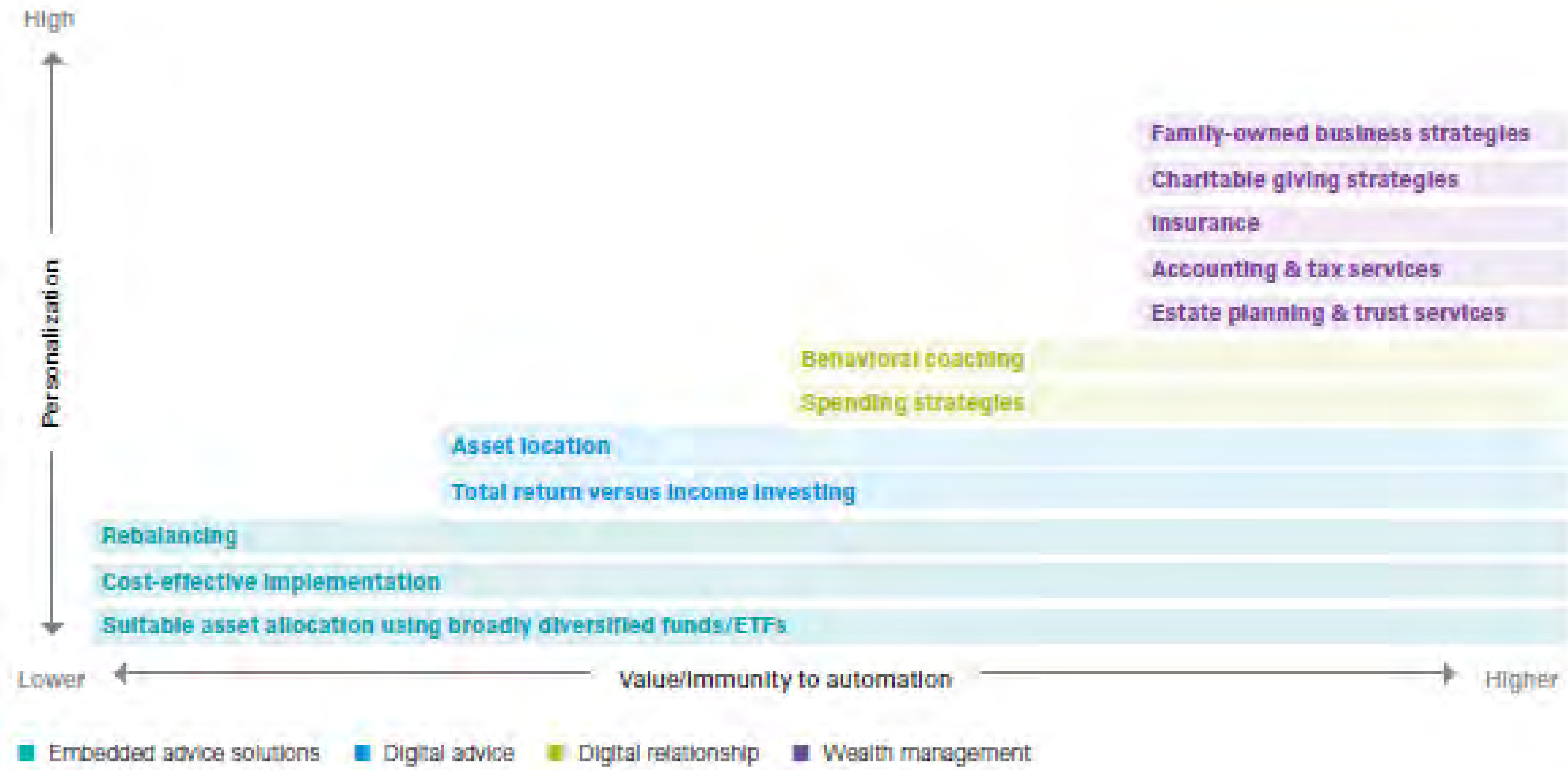
Technology and the Impact to Retirement Consumers in the Future

Nathan Zahm, FSA, CFA

Vanguard Enterprise Advice

Vanguard

Technology has the power to automate many financial advice tasks



Source: Vanguard, *The evolution of Vanguard Advisor's Alpha: From portfolios to people*

The private client of today is the every client of tomorrow

Financial Health

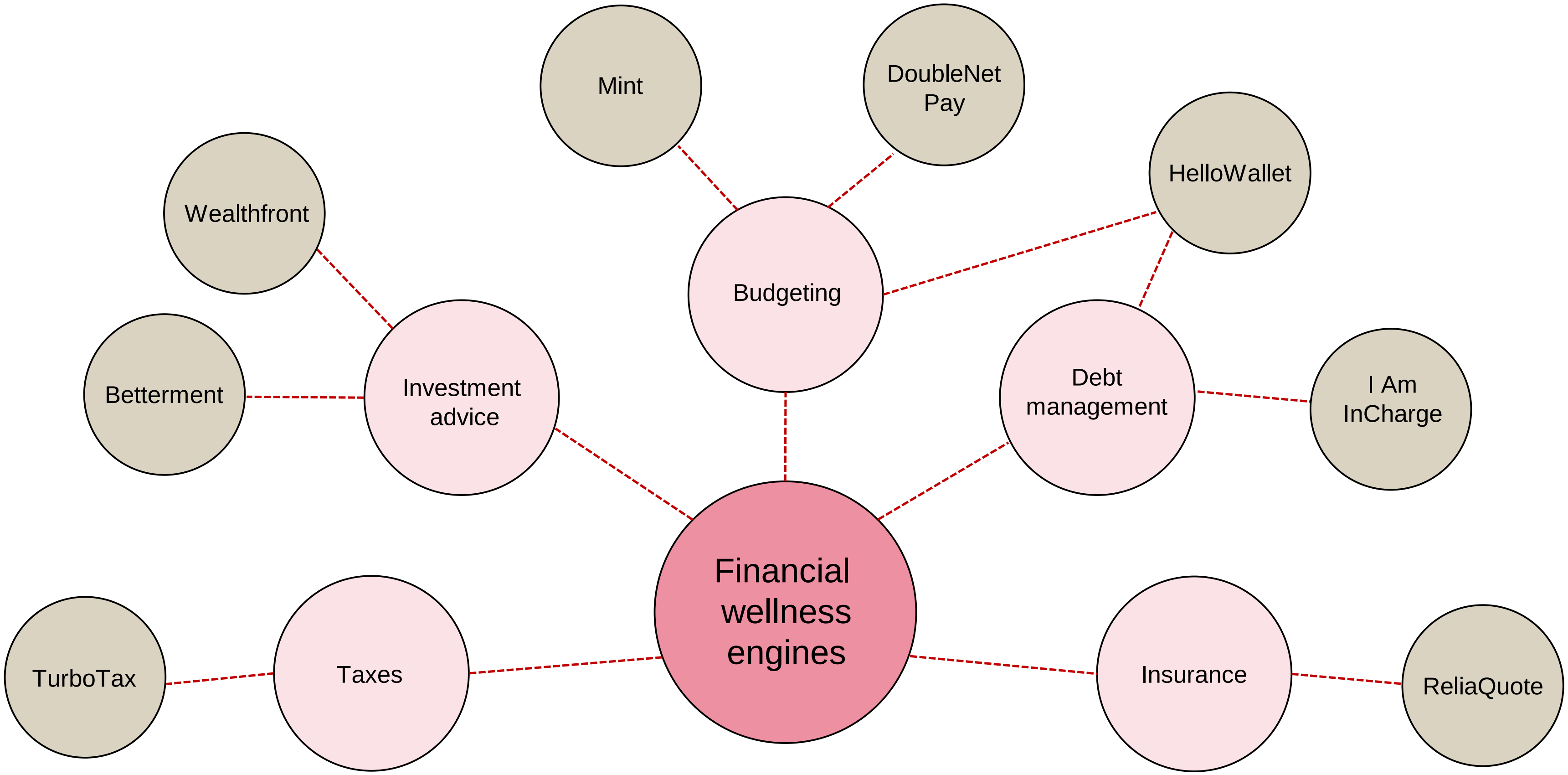
Investors seek advice on a range of financial considerations:

- Value of investments
- Retirement planning
- Debt
- Protection of wealth
- Taxes
- Inflation
- Health care costs
- Household budgeting

Source: Cerulli Association report, *U.S. Retail Investor Advice Relationships 2015*.

How does the transformation occur?

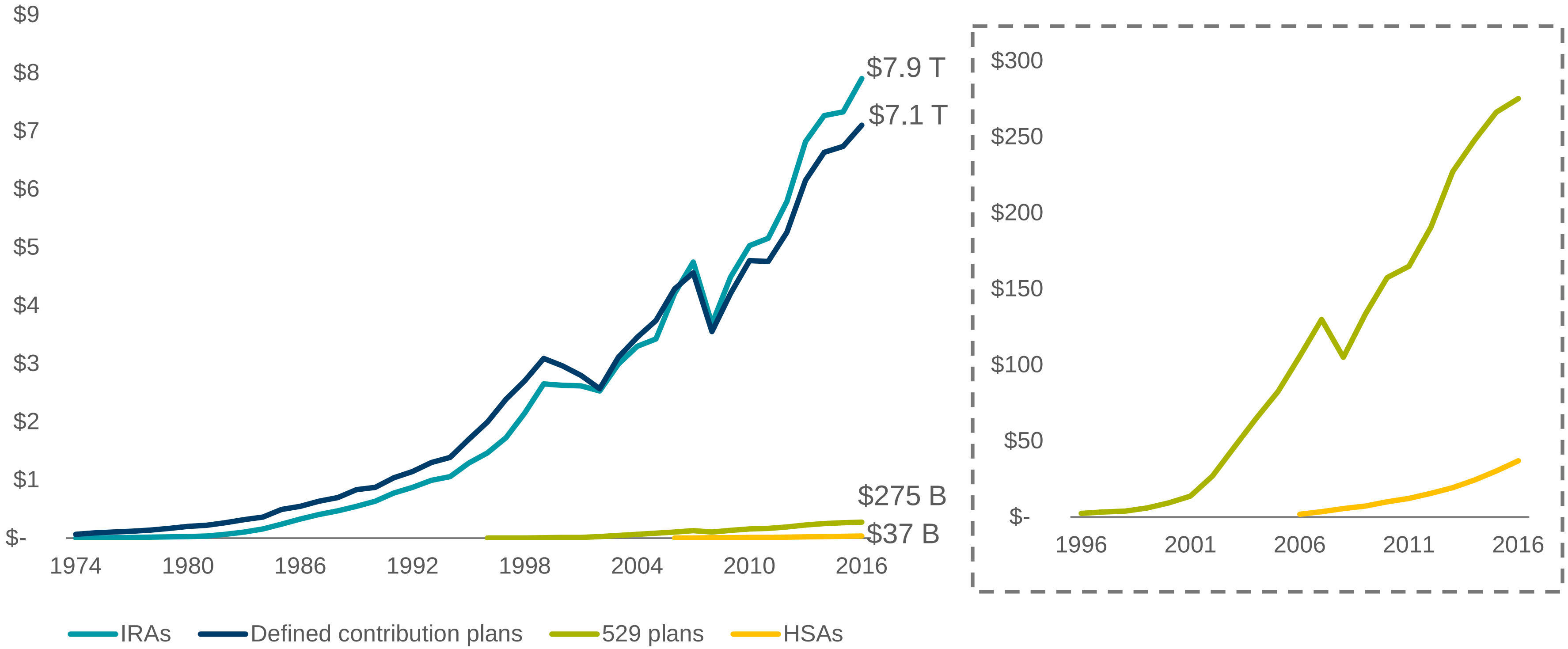
The convergence of digital financial solutions will create holistic financial wellness engines



Source: Vanguard

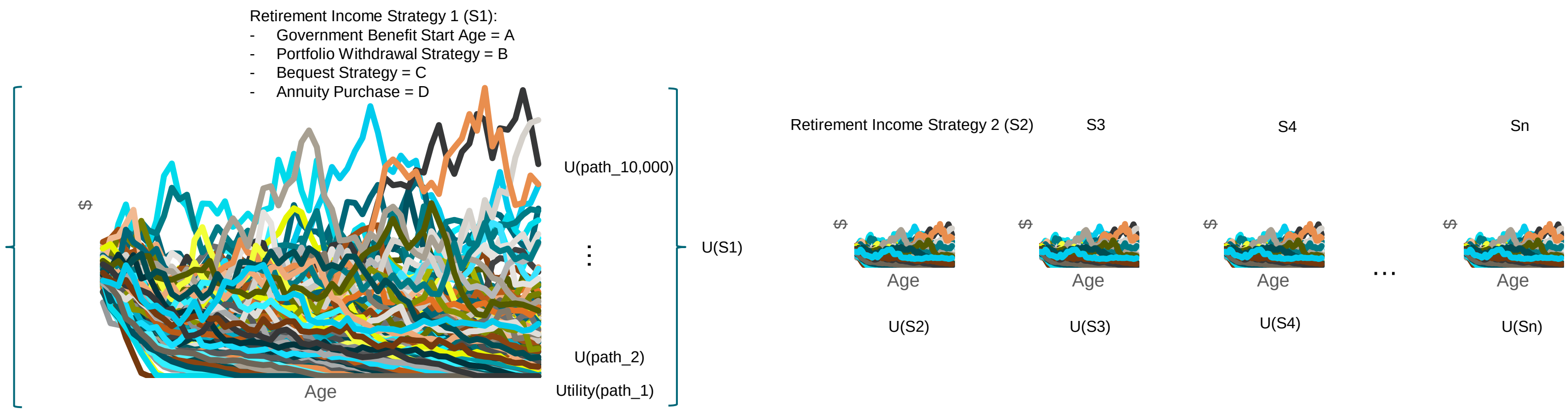
Example #1: Aligning the right account with the right goal

IRA, Defined contribution plans, 529 plan and Health Savings Account assets under management industry-wide



Notes: Defined contribution includes private employer-sponsored plans, including 401(k) plans; 403(b) plans; 457 plans; Federal Employees Retirement System (FERS) Thrift Savings Plan (TSP).
Data covers dates: for IRA assets and defined contribution assets, 1974-2016; for 529 plan assets, 1996-2016; for HSA assets, 2006-2016.
Sources: For IRA and 401(k) assets, Investment Company Institute; for 529 plan assets, Collegesavings.org; for HSA assets, Devenir HSA Survey

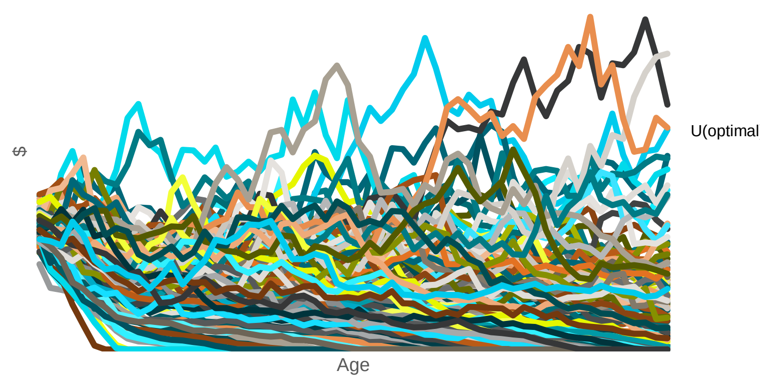
Example #2: Tax optimized retirement income



What is the best combination of strategies for a given set of investor attributes?

Retirement Income Solver Produces the Optimal Combination of Approaches

Optimal Retirement Income Strategy:
- Government Benefit Start Age = G
- Portfolio Withdrawal Strategy = C
- Bequest Strategy = F
- Annuity Purchase = Q



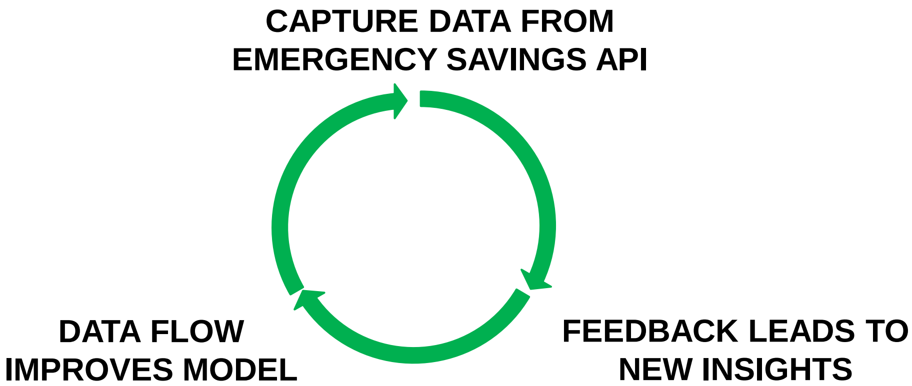
***The results are hypothetical and meant to reflect the concept of the model**

Example #3: Emergency savings

EMERGENCY SAVINGS OF THE PAST

Clients are advised to save 3-6 months of expenses to hold for emergencies

EMERGENCY SAVINGS FUTURE



Clients receive best guidance on emergency savings based on their situation situation

Source: Vanguard

Example #4: Personalizing the replacement rate

80%

80% replacement ratio is common in the advice industry

67% 93%
89% 81%
42% 72%
100%
70% 62%

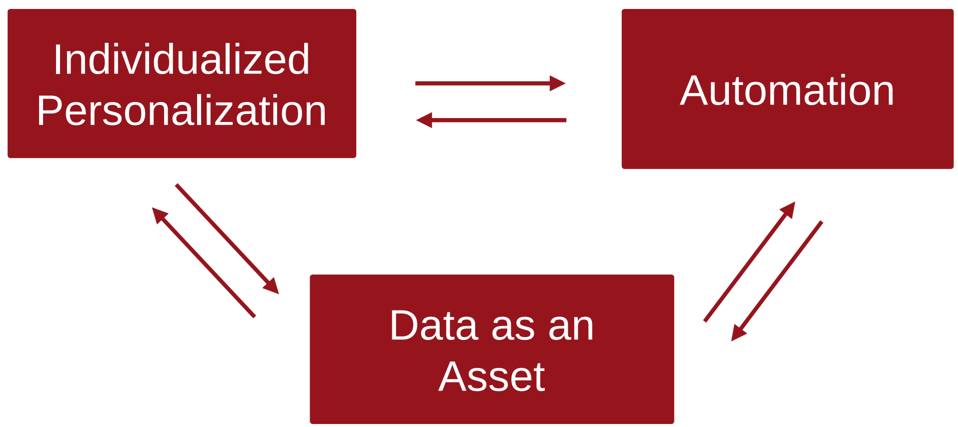
AI/ML prediction model suggests personalized replacement ratio based on household, income, savings rate, medical costs, wage growth, taxes, and lifestyle preferences

Source: Vanguard. *The replacement ratio: Making it personal*

Technology opens the door to AI-based solutions in retirement

Experiences <u>relevant and unique</u> to the individual, such as (illustrative examples)…

- Smart estimates (assets/liabilities): time horizon, replacement ratio, planning horizon, life expectancy, etc.
- Individualized expense analysis
- Life event triggers
- Behavioral nudges
- SRI/tilt propensity



Automation solutions that can both <u>complement and/or replace</u> the human touch (illustrative)…

- Scenario planning
- “Keyboardless” onboarding
- Agent interactions
- Intercept contact events

Source: Vanguard.

Technology can make advice accessible for all

Median advice fee by market segment

Notes: Advisory fees are reported by account size, rather than core market. For calculation purposes, we matched each core market to the closest account size. Mass market is $100,000; middle market is $300,000; mass affluent market is the average of $750,000 and $1.5 million; affluent market is the average of $1.5 million and $5 million; high net-worth market is $10 million.
Sources: Vanguard calculations using data from Cerulli Associates.

The future is accessible holistic advice

- Mass customization will be the norm
- Technology-enabled offerings
- Automated holistic financial planning
- Focus will be on strategies, not product types

Source: Vanguard.

Appendix

Retirement portfolio building is complex

Source: *Vanguard's roadmap to financial security*

Building portfolios with specific objectives and risks in mind

There are four common retirement goals

1 **Basic living expenses**

Create a sustainable, base amount of retirement income to cover core nondiscretionary, recurring living expenses

Food, housing, clothing, utilities, and recurring healthcare expenses

2 **Contingency reserve**

Maintain a sufficient liquid reserve to address surprise events

Extraordinary health care expenses, custodial-care expenses, and unexpected, large, mandatory expenses

3 **Discretionary spending**

Enable a level of spending beyond basic living expenses to maintain a preferred lifestyle

Vacations, dining out, leisure activities, and other large discretionary expenses

4 **Legacy**

Transfer wealth to heir or charities

Source: *Vanguard's roadmap to financial security*

Potential risks to manage can be grouped into five categories

Source: Vanguard.

Design solutions that utilize the most effective tools for the objectives and risks

Relative effectiveness: ● High ⦿ Medium ○ Low/not applicable

Goals supported

	Basic living expenses	Contingency reserve	Discretionary spending	Legacy
1. Guaranteed income Pensions/Annuities	●	○	⦿	○
2. Liquid assets Asset allocation/Spending policy	⦿	●	●	●
3. Other resources Life, home, and health insurance	○	●	○	⦿
Work (see Notes below)	●	⦿	●	○
Housing wealth	○	⦿	○	●

Risks mitigated

	Market and investment	Health	Longevity and mortality	Event	Tax and policy
1. Guaranteed income Pensions/Annuities	●	⦿	●	○	○
2. Liquid assets Asset allocation/Spending policy	⦿	⦿	⦿	⦿	●
3. Other resources Life, home, and health insurance	○	●	⦿	●	○
Work	●	⦿	⦿	⦿	○
Housing wealth	○	⦿	○	○	○

Notes: The relative effectiveness of financial resources compares their ability to support a particular goal or mitigate a specific risk and presumes each resource is available (for example “work” assumes the retiree is currently employed). Work is a highly effective resource to meet basic living expenses as long as the individual is willing and able.
Source: *Vanguard’s roadmap to financial security*

Retirement Planning Tools

Aging and Retirement

How do you know if you are saving enough for retirement?

It may seem like a simple question. Can I afford to retire? If you have ever begun to ask and answer this question you may start looking for an online retirement tool to assist in your quest for answers. Quickly you will find there is no shortage of retirement calculators these days. However, you may also be surprised to find they can and most likely will produce different answers. After all, starting with a simple question doesn't always find its way to a simple answer.

Not all retirement tools are created equal. Often there is more than one question to ask if you are thinking about retirement. Maybe you would like to know if you can retire at a certain age while still keeping up your current style of living. You might also be concerned about how long your retirement savings will last, or what might be the best strategy if there is a significant age difference between you and your spouse.

Among these various scenarios, calculators will have differences in styles and the level of detail needed to generate accurate results. Use this guide as a helpful tool in understanding how retirement calculators can be used and what to look for when picking out the retirement calculator that best fits your situation.

This guide is a resource to help you better understand how different retirement planning tools are used to estimate how much money you should be saving to retire comfortably with a reasonable assurance of meeting your future spending needs.

Where to begin?

WHAT IS THE QUESTION YOU WOULD LIKE THE TOOL TO ANSWER?

Determining how prepared you are for retirement depends on how you frame the question. Be sure the tool you are using was intended to answer the question(s) you are asking. For instance, are you looking for a range of acceptable outcomes, or are you seeking a very specific number as your goal? Retirement planning tools are designed differently to be able to answer various types of retirement scenarios.

WHAT IS YOUR SITUATION?

Given the complexity of the variables that comprise one's retirement income needs, it is unlikely that any single retirement planning tool will be able to do it all. You might use more than one retirement tool and discover that each of them gives you a significantly different answer.

IS THE TOOL USER FRIENDLY?

Do you feel your retirement planning tool is asking you too many questions or too few? Is the output easy to understand, or is it confusing? Take the tool for a test drive; if you don't like the way it handles, keep looking. In the end, the best retirement planning tool for you may be the one you are most likely to use.

WHO CREATED THE TOOL?

Bias, whether intentional or unintentional, is also a potential concern. The output of a retirement planning tool may be influenced by the entity that produces it. This could affect whether the output is biased or unbiased, so consider the source of the retirement planning tool when evaluating your options.

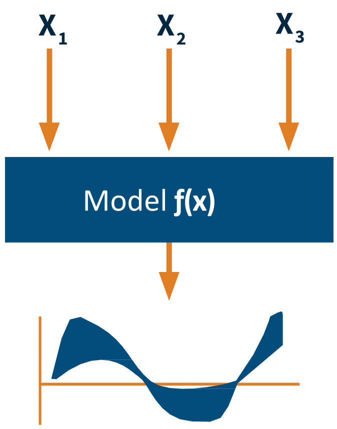
Additional Considerations

Methodologies

WHAT METHODOLOGIES ARE BEING USED?

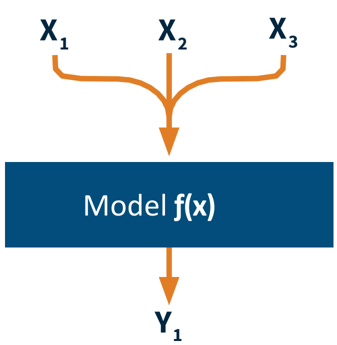
Retirement planning tools use a variety of methods when estimating outcomes. Some tools may use stochastic modeling (simulating volatility) to forecast probabilities and ranges of future values.

STOCHASTIC MODEL



Other tools may use a fixed or deterministic approach to arrive at a more specific outcome. Average values are assumed for unknown variables, like investment rate of return, in order to estimate future retirement outcomes.

DETERMINISTIC MODEL



It is vital to understand these differences and how they can influence your level of confidence in the outcomes when evaluating a particular retirement planning tool. A recommended practice is to explore your retirement possibilities by applying and comparing several retirement tools or calculators. If you can identify a common trend among the different outcomes, you can use that information to help see if you are making progress toward your retirement goal.

Additional Considerations (cont'd)

Assumptions

WHAT ASSUMPTIONS DOES THE TOOL MAKE?

Tools must assume values and conditions for variables to remain user friendly across a broad audience. A basic retirement calculator, for instance, might focus primarily on calculating the future value of one's nest egg while assuming average rates for investment return, inflation, longevity, etc. Users must take care not to underestimate the range and depth of risk that may be hidden within these assumptions.

A more complex tool, on the other hand, uses fewer fixed assumptions and allows for a greater amount of customization and flexibility with respect to evaluating changeable variables across ranges of possible values. This added flexibility brings with it additional levels of complexity and potentially confusion. Users who are not familiar with statistical concepts of variance and standard deviation, for example, may construct unrealistic scenarios, misinterpret the tool's output, or both.

Retirement Planning Tools

The Breakdown

To better understand what type of calculator will help in your retirement planning, we have classified them into three groups: Simple, Intermediate, and Advanced. All can have a use in retirement planning, but not all are right for everyone.

SIMPLE CALCULATORS

Simple calculators generally ask for less information and rely more heavily on assumptions, which may result in less precise output than more advanced tools. Simple calculators may be best for someone that is just getting started with retirement planning, or that is simply looking for a quick calculation that does not require a lot of information.

See the section on Simple Calculators to find out more.

INTERMEDIATE CALCULATORS

Intermediate-level retirement calculators offer more flexibility and potentially higher levels of detail than simple calculators. These tools may allow users to adjust certain factors that will likely affect your retirement outcome, such as inflation rates and investment rates of return. Intermediate calculators may be best for someone that has already done some preliminary retirement planning and has more information available to run a more precise estimate.

Look at the Intermediate Calculators section to discover more about these tools.

ADVANCED CALCULATORS

Grab a cup of coffee, your financial documents, and have a seat! These calculators are going to ask you for many details about your specific retirement situation, so take your time. The more accurate the information going in, the more precise the results coming out. These calculators, although time consuming, have the potential to be very helpful in complex retirement situations. Advanced calculators may be best for someone approaching retirement, especially if they have a variety of assets and income sources that cannot be handled by an intermediate calculator.

To find out more if this type of calculator is worth your time, see the following section on Advanced Calculators.

Simple Calculators

DESCRIPTION

A Simple retirement calculator will have typically have fewer questions and rely on more assumptions in its result. These calculators are meant to give a more general type of answer. Given their limited objectives, they avoid asking very detailed questions about your current or future spending habits or whether you have any specific goals in retirement which would need funding.

TYPICAL QUESTIONS

Retirement Accounts	• Current Balance • Annual Additions • Growth Rate
Age (You and Spouse)	• Current • Longevity • Desired age at start of Retirement
Duration of Retirement	• Length in Years • Annual Withdrawal • Growth Rate on Accounts
Income (You and Spouse)	• Current • Annual Increases • Desired Replacement Percentage • Include Social Security
Taxes	• Current Income tax bracket • Anticipated income tax bracket in Retirement
Retirement Expenses	• Approximate Health Care Costs • Debts • Family members needing financial help

Simple Calculators

ROLE OF ASSUMPTIONS

Simple retirement calculators extensively use common assumptions about retirement to do the heavy lifting and offer little in the way of customization. Key assumptions include but are not limited to:

- Inflation constant at 3%
- Tax Rates remain constant
- Life Expectancy: typically age 95
- Expenses remain constant

LIMITATIONS

Simple retirement tools are helpful at estimating the future value of your savings and can help you see if you are potentially contributing enough to an IRA or a retirement plan at work. However, they are not equipped to handle other factors that might affect retirement success, such as changing rates of inflation or whether you elect to claim Social Security retirement benefits at a younger or older age, etc.

Ideal Users

Younger individuals looking for ball park estimates on:

- Employee deferral rates
- Additional Retirement savings needs

Intermediate Calculators

DESCRIPTION

An intermediate level retirement calculator will go into more detail, but it may also be more difficult to use. It will ask you a variety of detailed questions about your current finances and your future goals, and it may also allow for some variation in some of the variables, such as rates of return on investment, tax rates, longevity, etc.

TYPICAL QUESTIONS

Retirement Accounts

- Current Balance
- Annual Additions
- Growth Rate

Age
(You and Spouse)

- Current
- Longevity
- Desired age at start of Retirement

Duration of Retirement

- Length in Years
- Annual Withdrawal
- Growth Rate on Accounts

Income
(You and Spouse)

- Current
- Annual Increases
- Desired Replacement Percentage
- Include Social Security

Taxes

- Current Income tax bracket
- Anticipated income tax bracket in Retirement

Retirement Expenses

- Approximate Health Care Costs
- Debts
- Family members needing financial help

Intermediate Calculators

ROLE OF ASSUMPTIONS

Assumptions start to lessen in importance as this calculator tends to ask more details about your specific situation. Key assumptions include but are not limited to:

- Inflation constant at 3%
- Tax Rates remain constant throughout life
- Expenses remain constant

LIMITATIONS

Intermediate calculators are more advanced and can give you a better idea of how your retirement savings and investment efforts are coming along. However, they may not take into account future conditions for taxes, health care costs, Social Security decisions, etc.

Ideal Users

Mid-Career individuals inching closer to retirement. They can use these calculators to:

- Understand how long current retirement account balances may last.

Advanced Calculators

DESCRIPTION

Advanced retirement calculators may be geared more toward use by financial professionals or those who have a significant amount of personal finance experience. Featuring the ability to evaluate many adjustable inputs and outcomes, these tools often employ stochastic models that evaluate a variety of random outcomes, such as prolonged market downturns, higher taxes or health care costs, variations in spending patterns, and so forth. Consequently, the output from these tools often illustrates the probability of achieving various retirement goals, rather than a simple "number" in terms of how much to save, invest, or spend for retirement.

TYPICAL QUESTIONS

Retirement Accounts

- Current Balance
- Annual Additions
- Growth Rate

Age
(You and Spouse)

- Current
- Longevity
- Desired age at start of Retirement

Duration of Retirement

- Length in Years
- Annual Withdrawal
- Growth Rate on Accounts

Income
(You and Spouse)

- Current
- Annual Increases
- Desired Replacement Percentage
- Include Social Security

Taxes

- Current Income tax bracket
- Anticipated income tax bracket in Retirement

Retirement Expenses

- Approximate Health Care Costs
- Debts
- Family members needing financial help

Advanced Calculators

ROLE OF ASSUMPTIONS

These tools still use plenty of assumptions regarding longevity, tax rates, rates of return on investment, etc. It is, therefore, important that the tool or professional discloses any assumptions used in the calculations. In addition, the end-user is often able to modify several or even all these variable inputs and construct rather elaborate and multiple scenarios for comparison.

LIMITATIONS

Advanced retirement planning tools are great for someone who is within a few years of retirement. However, they can be very complicated to use, and interpreting the results may be difficult. This might be a good time to compare different calculators or better still, consult a trusted financial professional for a second opinion.

Ideal Users

- Individuals who are actively thinking of retiring within the next 5 years.
- Financial professionals who provide clients with guidance or advice about retirement.

Conclusion

A good practice is to find more than one retirement tool with desirable features and assumptions that are appropriate for your individual needs. If your outcomes across multiple tools begin to produce similar trends, you are probably looking at a reasonable retirement forecast.

It is also a good idea to periodically revisit your retirement preparedness. Your financial and lifestyle circumstances are likely to change over time. Fortunately, new and improved retirement planning tools are continuously being developed, making it easier to compare projections and reevaluate your retirement preparedness along the way.

WHAT DOES A "GOOD" CALCULATOR LOOK LIKE

Foremost, whatever calculator or similar tool you select should be unbiased in its approach. Use tools tied with selling financial products with caution and compare results with a less biased retirement planning tool.

As noted earlier, whatever assumptions the tool incorporates should also be reasonable and appropriate for your situation. The tool should clearly disclose what types of assumptions are made.

- ✓ **Unbiased**
- ✓ **Agreeable Assumptions**
- ✓ **Good**

GARBAGE IN GARBAGE OUT

Even the best retirement calculator is going to produce bad output if the information fed into it is incorrect or missing. With this in mind, be sure you have a good working knowledge of the inputs needed by your chosen retirement calculator. Make sure you also have all of the necessary details available, so the data you feed to the tool is as accurate as possible.

A better practice is to combine the use of retirement planning tools with additional guidance from a trusted financial coach to help you translate the results and discuss your individual financial strategy.

Appendix A

Who can help

Retirement planning is one of the more complex and dynamic aspects of personal financial planning. A periodic look at a general or basic retirement planning tool can provide helpful feedback to see if your retirement planning efforts are on track. Many company retirement plans (401(k), 403(b), etc.) provide these tools to help guide plan participants, and it is a good practice to use these at least once a year or so to measure the general direction of your retirement preparedness efforts.

What if you need more detailed information, however, or suppose you are getting very close to making a retirement decision? With so many different retirement planning tools available, how can you be more confident? Reviewing the tips and best practices mentioned in this guide is a good start. In addition to comparing the results of several different retirement planning tools and calculators, a second opinion from a trusted financial professional can also help. Be sure to also verify the licenses or credentials of any advisor you choose.

CERTIFIED FINANCIAL PLANNER™

The CFP Board of Standards and the Financial Planning Association each have convenient online search features available for the public to identify and contact CERTIFIED FINANCIAL PLANNER™ professionals in their local areas:

- CFP Board: Find a CFP® Professional
- Financial Planning Association: Planner Search

CERTIFIED PUBLIC ACCOUNTANT (CPA)

The American Institute of Certified Public Accountants (AICPA) is the national professional organization of CPAs in the United States. In particular, CPAs who also hold the Personal Financial Specialist (PFS) designation include personal financial planning as an area of focus for their accounting practices.

- AICPA: Credential Directory

Who can help (continued)

SOCIAL SECURITY ADMINISTRATION

Your Social Security retirement benefit plays an important role in retirement planning. In particular, the age at which you choose to begin receiving these funds will permanently affect the size of your benefit check. Based on anticipated longevity and other factors, claiming early at age 62 might be an appropriate choice for some, while delaying to age 70 in order to claim a larger monthly benefit check might be a better choice for others. The Social Security website's retirement estimator tool can help you see how these timing choices may affect your future benefits.

- Social Security Retirement Estimator

LONGEVITY CALCULATORS

None of us can know for sure how long we might live, but we can estimate the likelihood of living to a particular age range. Based on a best guess approach using reasonable probabilities, you can use this information to help make decisions about timing your retirement or activating income benefits. Using just six basic questions, a longevity estimation tool is available from the Society of Actuaries and American Academy of Actuaries to help you quickly estimate your potential longevity. Those interested in a deeper dive into their longevity odds can answer a more detailed and lengthier battery of health and lifestyle questions at Livingto100.com, created by Dr. Thomas Perls.

- Society of Actuaries and American Academy of Actuaries: Longevity Illustrator
- Living to 100: Life Expectancy Calculator

Appendix B

Additional Reading

As we have seen, retirement planning tools are not only numerous, but they can also be quite complex. A detailed description of the various inner workings of these tools is beyond the scope of this guide, however. Readers who are interested in more details regarding the use of retirement planning tools, methodologies, assumptions, and other technical aspects of this software may wish to review some of the current literature on this and related topics:

- Benartzi, S. (2017). How digital tools and behavioral economics will save retirement. Harvard Business Review. Available at: https://hbr.org/2017/12/how-digital-tools-and-behavioral-economics-will-save-retirement

- Turner, J. and Witte, H. (2009). Retirement planning software and post-retirement risks. The Society of Actuaries and The Actuarial Foundation. Available at: https://www.soa.org/resources/research-reports/2009/retire-planning-software-post-retire-risk/

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Appendix C

Glossary

INPUTS

Values, assumptions, and other information to be entered into a retirement tool for processing and evaluation.

OUTPUTS

Financial projections, estimates, and related information generated by a retirement planning tool.

METHODOLOGY

A set or system of methods, principles, assumptions, and rules for evaluating and projecting potential retirement outcomes.

RATE OF RETURN

In finance, the ratio of the annual income from an investment to the original investment, typically expressed as a percentage.

INFLATION

A persistent, substantial rise in the general level of prices related to an increase in the volume of money and resulting in the loss of value of currency.

GROWTH RATE

The amount by which a variable increases over a given period of time as a percentage of its previous value.

STOCHASTIC MODELS

Stochastic retirement tools assign random values to various input variables and produce a distribution of retirement outcome probabilities, rather than predicting precise values.

DETERMINISTIC MODELS

Deterministic retirement planning tools apply relatively fixed parameters representing one's financial situation to produce projections of future retirement spending based on estimated rates of investment return.

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This document does not provide advice for specific individual situations and should not be construed as doing so. It is an informational resource intended for general guidance. Individuals needing specific advice should seek the services of a qualified professional.