Enterprise Driven Investing (EDI) for Insurers V2.0 Active Customization (AC)

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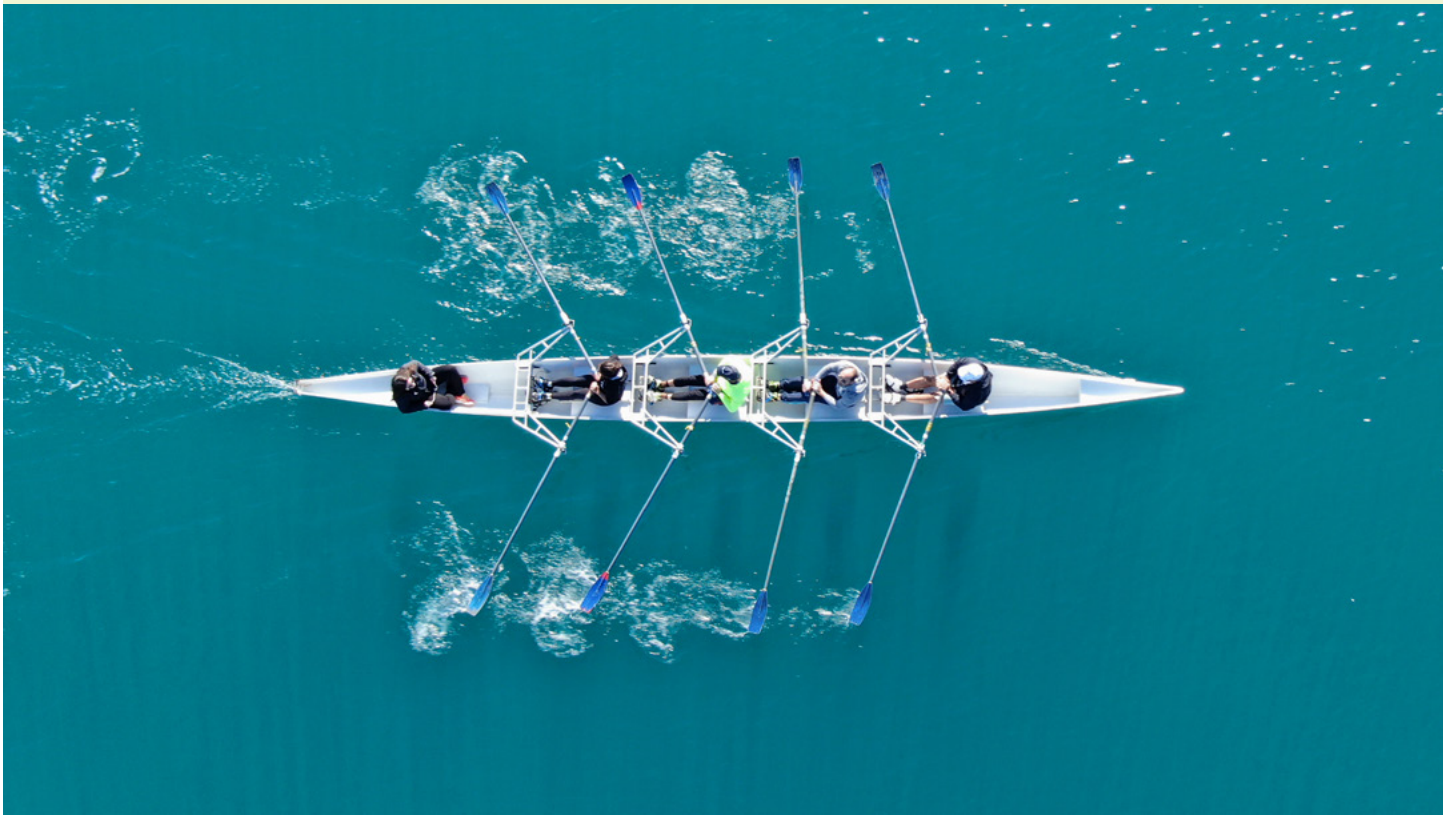

ABSTRACT

Management of insurance company investment portfolios has become a task of extraordinary complexity. The goal of this paper is to elevate and answer two process questions. One is how to configure the interface of expanding business requirements, which we call enterprise customization, with portfolio design. A second and related challenge is determining how and when to increase or reduce customization intensity based on its relationship with projected portfolio risk and return. Customization strategy has a highly levered impact on asset allocation. We assert that managing customization effectively has importance to enterprise performance second only to meeting customer expectations profitably. Our concept of "Active Customization" addresses the shortcomings in conventional and more passive approaches, which can include obscured pricing, dormant leverage, bias, narrow scope, and less than adequate coordination. Firms employing Active Customization benefit from emphasizing strong team dynamics, judgment informed by "build-to-suit" quantitative measures, transparency, and interactive visualization.

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INTRODUCTION

Until the 1970s, insurance company investment strategy evolved slowly. The selection of core lines, degree of actuarial certainty, the form of ownership, and jurisdiction all drove portfolio liquidity, financial leverage, and design of financial objectives. Asset allocation was more accounting-based than strategic. Investment managers invested reserves in high-grade corporate bonds to match liabilities and earn a spread, periodically narrow but almost always justified ("lock in" high yields, or "more income" to offset low yields). The surplus account was invested in risk assets such as indexed equities for capital growth.

Credit analysis was paramount and, therefore, unparalleled in the skill demonstrated, as financial statement treatment was more supportive of a buy-and-hold approach than trading. The investment function was frequently isolated and defined performance more by credit migration than asset allocation. Portfolio management was complicated, but not complex, in this specialized corner of the investment world. Periodic headline failures notwithstanding, regulations worked more than not, and they continue to change with increased pace as the industry restructures. Financial engineering proliferated on both sides of the balance sheet beginning in earnest in the '80s, for many reasons (good and bad), fueling an internal arms race with very different quantitative methods often targeting precisely the same questions.

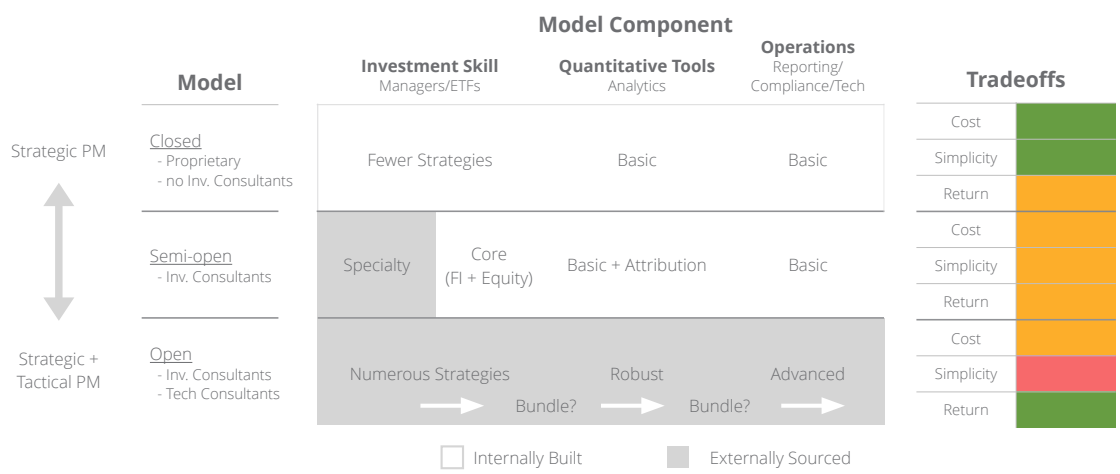
Initially, outsourcing was limited to smaller insurers motivated to offload arcane and manually intensive investment accounting bundled with bond portfolio management for low fees. While understandable, this approach vastly undervalued the potential contribution of more active investment and risk management over risk avoidance. The more significant, straightforward, and lucrative growth opportunity for most third-party managers was pension pools, fueled by the passage of the Employee Retirement Income Security Act, endowments, and foundations. The insurance industry itself has entered the third-party business periodically, with mixed success. Much has changed over the last decade. The dominant theme now is for insurers of all sizes to outsource increasingly specialized general account mandates, if not the entire portfolio ("outsourced CIO"). This change is due, in large part, to low yields in traditional fixed income sectors now compounded by the rapidly accelerating and underestimated cost of risk for exposures in healthcare, cybercrime, climate change, and social inflation.

As the defined benefit plan segment of institutional management shrinks, third-party managers have been more than happy to accommodate this increased demand from insurers despite the complications and continued pressure to reduce fees by these companies passing through their financial pressures. The scale and speed of transition to private markets and complex/opaque vehicles by insurers, and other yield-deprived investors, has been dramatic and risky. Asset management firms are starting or buying insurance companies as a source of growth in sticky AUM. With insurtech launches and new insurance linked securities expanding beyond legacy catastrophe bond structures, these growing sources of risk bearing capacity are redefining the entire insurance landscape and, therefore, its asset management. Over time, managing insurance portfolios has gone from something viewed as excruciating and bewildering to exciting.

Operationally, because of this new popularity and dramatic gains in technology, the office of the insurance CIO today is (and should be) undergoing redesign, including new roles, and using new data with new systems built or acquired through the growing number of interested suppliers. Office model options continue to evolve (Exhibit 1).

Exhibit 1

Insurance CIO Office Models



Also, every one of the other closely attached functional disciplines (actuarial, Enterprise Risk Management, finance, underwriting, regulation, product development) is undergoing its own profound and often technically rooted set of changes, sharing some unanswered questions surrounding the future of mechanisms like blockchain and crypto. Finally, moving up to the corporate level, the insurance industry is far from immune to the wide-reaching impact of adding new socially conscious stakeholder groups to the list of constituents where sometimes conflicting interests need to be balanced. Anyone who thinks the insurance industry doesn't change hasn't been paying enough attention.

Insurance asset management has undergone major transitions in portfolio construction, investment scope and operations due to evolving corporate strategy, industry restructuring, technology, and other trends. Throughout this history, leaders have always recognized the need to tailor a balance sheet, but the challenge has never been as multi-faceted as today, and the process often lacked full integration and strategic clarity.

But what does Active Customization have to do with all these changes? Everything. These changes have increased and altered business needs that, along with low fixed income returns, magnify the importance of actively managing all the enterprise tradeoffs. Reporting data[2] has highlighted greater risk-taking as the dominant response. But what about making advances to better, or begin, evaluating neglected tradeoffs to achieve superior enterprise performance over time? Active Customization is our approach to adding this play to the game plan.

USING ACTIVE CUSTOMIZATION TO MANAGE ENTERPRISE TRADEOFFS

Portfolio customization is getting increasingly popular for all investors. Insurance companies gain confidence from highly statistical models and other largely quantitative portfolio construction methods. While indispensable as tools, increasingly powerful optimization systems often obscure the critical tradeoffs between investment results and enterprise priorities. The same holds for the more common class of industry portfolio construction methods in which management, not the black box, selects a strategy based on a relative capital efficiency subject to preset asset class or factor exposure limits and a stress test boundary.

But high stakes questions like the following are sometimes not part of the model portfolio discussion, irrespective of whether a machine or person selects strategy:

- When and how should we change (up or down) the aggregate business customization leverage to improve the tradeoff with investment risk and return?
- How should we determine the form of business customization that best captures management's assessment of financial and strategic priorities?
- Are we spending time on decisions with the **greatest potential impact** or only on those with the **most visibility**?
- Which of our customization needs are the capital markets pricing most, and least, expensively?
- Are we assuming risk in unintended ways with the policies we use and omit?
- Is our business customization out of sync with today's realities for our company, constituents, the industry, or society?

We introduced the concept of Enterprise Driven Investing (EDI) in May 2017[3] to provide a comprehensive, intuitive framework that repositions customization from intermittent and isolated changes in assumptions to dynamic tradeoffs with investing constrained only by diversification. Using the feedback we received, we've made enhancements that place the tradeoffs described above into two categories, bottom-up Customization alpha (C_α) and top-down Customization lambda (C_λ).

Through C_α, an executive team selects, designs, and weights the customization attributes they believe are best for their organization with a clear-eyed understanding of the financial consequences. C_λ is their calibration of customization based on tradeoffs with portfolio risk and return. Both C_α and C_λ are highly dynamic. Leadership rebalances C_α as an integral part of the scheduled review of portfolio strategy. They also set C_λ, a new form of leverage, in such reviews and when there are significant changes in the capital markets that lead to tactical rebalancing. We have also created an Enterprise Ratio to assist management with the C_λ tradeoff decision.

[2] Insurance Asset Outsourcing Exchange, assetoutsourcingexchange.com/;
Yu, M. (September 23, 2021). New England Asset Management Insights; 2020 P&C Industry Investment Highlights; The Fight for Yield Continues; "Over the last decade, the industry's risk asset allocations increased by more than 25% and BBB-rated fixed income experienced an 89 bps reduction, with book yield now 125 bps lower than it was 10 years ago."
[3] Poutsiaka, W. (2017); Insights, Weiss Multi-Strategy Advisers, LLC; Enterprise Driven Investing for Insurance Companies: The Hot Mess – And Future – of Asset Management.

Active Customization keeps humans in the loop, informs judgment with focused quantitative output, prevents customization at any cost, uses a proven decision model originating in other industries for C_{α}, and relies as much on visualization as the math behind it. We believe the methodology is transferable to all other investors adopting the portfolio customization mantra that financial intermediaries like insurance companies have wrestled with for time and eternity. We've put most technical matters in the background for this practitioner's guide, besides necessary references here and there, and plan to address these aspects in detail in a future paper. The work associated with this follow-up paper may result in changes to the design expressed in this version.

Implemented well, Active Customization repositions portfolio updating from periodic changes in model assumptions to highly scrutinized, scheduled and condition-dependent tradeoff decisions with potential for improving enterprise performance significantly. These decisions (1) establish customization components and weights (Customization alpha, C_{α}), and (2) balance customization intensity with portfolio risk and return (Customization lambda, C_{λ}).

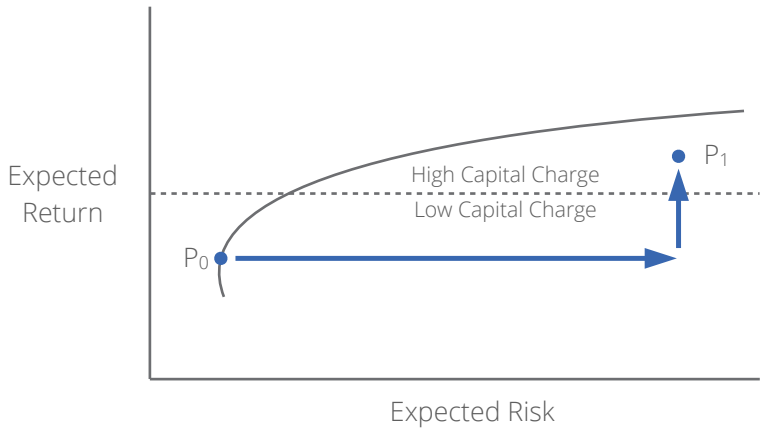
SORTING OUT THE HOT MESS (KIND OF)

The first version of EDI provided a better picture of the interaction between the investment strategy and sources of customization. In addition to showing the investment benefits of an investment motivated rebalancing, this framework highlighted, in descriptive terms, the impact on individual and strategically prioritized enterprise factors. We put the puzzle pieces together, as shown in the stylized examples below for two companies having excess liquidity. The way to view this information is to compare the magnitude of portfolio improvement against the table of factors, especially those that are critical (high in the table), start from a low score (red) and deteriorate as a result of the rebalancing ("-").

Company A (Exhibit 2): This is a company with a well-diversified portfolio and substantial capital that can tolerate some loss of diversification. The portfolio would gain absolute return with a modest direct holding of real estate equity. As shown, the increase in return is relatively small, requires a disproportionately large increase in risk, and comes at the expense of other factors shown in the adjacent table. This rebalancing constitutes a marginal argument for the use of excess liquidity, which should lead to an expanded discussion of other possibilities tied to the core business. For example, *is the excess balance sheet liquidity better deployed for attractive premium financing for clients?* EDI often guides the dialogue to another place, rather than conclude with a decision.

Exhibit 2

Company A



Metric (Descending Importance)	P0 → P1
ROA (Growth BV)	+
Capital Efficiency / Limit	-
ROE	-
Earnings Vol	—
ALM	NC
Risk	-
Liquidity Requirement	-
Sharpe Ratio	—
Fees / Expenses	-
Taxes	NC

Company B (Exhibit 3): This company also has excess capital and, for this reason and because of the weak insurance pricing, is considering a share repurchase. The Investment Committee has concentrated the portfolio in liquid high-grade corporates and sovereigns. In the capital market, there is a significant discount to Net Asset Value for secondary private equity due to technical factors. Reduction in the liquidity profile allows a rebalancing that captures significant return through (1) the attractive illiquidity risk premium, and (2) a higher returning asset, while also improving diversification. As the table shows, this portfolio change would lead to meaningful improvements in both growth in book value (GBV), from a mediocre rate, and the Sharpe ratio from a low point. However, it also creates more risk in Return on Equity (ROE), to which management has assigned above-average importance. In certain cases, the greatest benefit of EDI is to identify the most important question. *Do Company B's investors have a long-term horizon that will place more importance on the significant improvement in book value, or will the risk to ROE and near-term benefits of a repurchase program have more importance to them?*

FEEDBACK ON EDI V1.0: PERCEIVED VALUE AND TWO MAJOR SHORTCOMINGS

We received very constructive industry feedback on the first version of Enterprise Driven Investing. Customization was beginning to feel more strategic than the product of rigid and unconnected rules, an over-simplified definition of "conservative" or something the scenario generator would just figure out. Many liked the broader enterprise perspective (relative to Liability Driven Investing) on one page, the replacement of the internal modeling arms race with functional integration, and the role of both judgment and quantitative output. Others liked the transparency and visual format that enhanced decision-making, and the open platform approach regarding quantitative asset allocation models. But this feedback also put a bright light on two serious shortcomings.

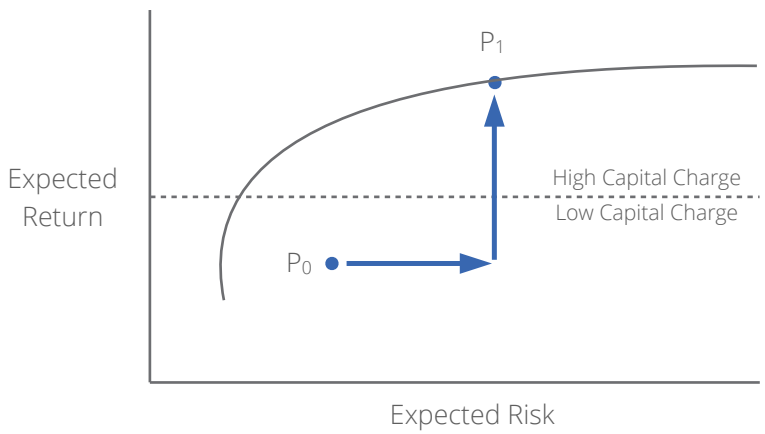
Some commentators indicated there was still more noise than signal. The initial representation lacked a single, high-level portfolio customization measurement comparable to the axes forming the risk and return geography. The offsetting business consequences of a rebalancing in the heat map table failed to indicate the net customization direction in the way changes in a portfolio's overall value has consolidated the individual winners and losers, which can be translated to aggregate risk and return.

The initial EDI procedure also assumed that the investment perspective was driving the rebalancing bus. While the business consequences could veto the destination, they would need to accept the route. As a result, we had failed to answer the following corollary to a key question posed earlier…

When and how should we reduce and alter the emphasis on purely investment properties to improve their tradeoff with business requirements?

Exhibit 3

Company B



Metric (Descending Importance)	P0 → P1
Capital Efficiency / Limit	-
ROA (Growth BV)	++
ROE	-
Earnings Vol	-
ALM	NC
Liquidity Requirement	-
Sharpe Ratio	+
Risk	-
Taxes	-
Fees / Expenses	—

In recent years ESG considerations, emerging insurance risk, and continuation of challenging conditions in the capital markets have made a strong case for Active Customization, as the next evolution of EDI, even stronger.

AC AS A PREMISE TO THE DESIGN OF INVESTMENT OBJECTIVES

Insurance entities create their goals and financial objectives by considering lines of business, form and composition of ownership, jurisdiction, and, more recently, ESG and other stakeholder interests. The investment objective is typically one of two types: (1) total return for the entire portfolio, or (2) separate objectives for fixed-income securities backing reserves such as net investment income (NII) and total-return assets supporting surplus. There is room, and merit, for further refinements, such as pre- or after-tax, etc., and unlimited variations within each category in use currently.

We addressed the development of investment objectives with EDI V1.0 and limit the scope here to AC-related and other organizational benefits. We recommend always having primary and secondary investment objectives (the latter as a constraint), both of which we apply to the entire portfolio. Choices remain limited to income and total return categories, with the pecking order determined by the design process referenced above.

Adopting a secondary objective represents an essential source of enterprise value and financial discipline for companies that actively manage customization. Consider hypothetical circumstances of an annuity company, a spread business whose investment objective is to maximize rolling NII and uses a capital-efficient asset allocation model.

Our example firm outperforms all competitors on an NII basis with a below-average allocation to risk assets and by assuming above-average credit and illiquidity risk. But rates remain low, fixed-income risk premia have compressed, and risk assets have produced stronger returns as a better investment option. The company has hit a regulatory limit for financial leverage and their business model is out of step with the market cycle. Ultimately, NII declines and GBV lags competitors by a wide margin.

Suppose one of the company's customization components had included a secondary investment objective, such as a requirement limiting three-year projected, annualized total return from falling more than 50 basis points below their model portfolio, packaged with a formal mechanism like AC that tactically swaps some primary NII for secondary total return when it is very attractive to do so. In that case, the outcome might have been much more favorable. *Described using the language of Active Customization, decision makers would periodically buy customization because the expense of doing so (the opportunity cost to their primary investment objective) was cyclically low.*

Different but equally important benefits of this approach would apply to a non-public, "balance-sheet" underwriter of more volatile lines. Appropriately, this industry segment has a longer time horizon and expands this advantage in various ways, including less risk (and margin) transfer to others for financial smoothing purposes[4], more private market investments with extended timetables, and multi-year total return as their investment objective. However, their inclusion of an NII floor as a portfolio-wide secondary constraint is an important recognition that the entity remains an operating company with minimum profitability goals and cashflow needs, irrespective of core lines and ownership structure. Best practice AC includes this hierarchical guardrail for financial balance.

Having dual and prioritized investment objectives for the entire portfolio yields benefits beyond AC. For companies adopting this approach as a change from separable reserve and surplus assets, the architecture increases asset allocation flexibility, the largest driver of return. In addition to this theoretical advantage, the structure fosters asset allocation creativity as a habit, rather than by exception to a rigid bifurcation policy. For example, a P&C company may substitute some liability-hedging risk assets in place of fixed-income reserves when solvency measures are exceptionally high, and the exposure of long-tailed reserves to inflation is accelerating faster than yields. More generally, alternatives can play a key role for long-dated liabilities. Similarly, there may be times (again) when it is far better to invest a portion of surplus in bonds to capture cyclically high yields or to improve a borderline capital measure, or both.

We've looked but not found major drawbacks to incorporating a secondary investment objective as a key component of portfolio customization. Employing the classic "risk asset" portfolio separation is intuitive at some level and helpful with financial peer analyses. But when electively deployed as a strict operational policy, bifurcation does not add meaningful risk control in the presence of vastly superior Enterprise Risk Management (ERM) models now commonplace. Finally, our proposal explicitly recognizes for performance the "in-class" activities driven by both metrics, regardless of their corporate ranking. Examples include increasingly popular multi-sector fixed income mandates tilting between sleeves for total return enhancement, or new engineering efforts to package total return assets for better capital efficiency or income preference.

[4] Assuming retention of strong claims paying ratings.

In all instances, we endorse establishing a primary investment objective (income or total return) based on a company's most basic strategic needs, and a secondary investment objective (income or total return). Management applies both objectives to the entire portfolio, but the secondary objective is one component in the full set of customization factors.

THE SECOND STEP IN ACTIVE: *WORKING* WITH CONSTRAINTS

Customization, including the so-called free lunch of diversification, usually comes with a tab on otherwise unencumbered return, greater risk of some type, or both. ESG has become a flashpoint for this question ethically, financially, and legally. Customization obligates corporate leadership to identify organizational priorities that manifest in security attributes for inclusion in portfolio construction. The price of admission to AC is that management scales the factor at the portfolio level, including performance breakpoints and limits. Business requirements for insurance companies generally fall into the two groups described below that, along with the secondary investment objective, represent the focus of C_{α} and C_{λ}.

Financial intermediaries appropriately build solvency-efficient balance sheets using stress test metrics (both economic and accounting) such as capital charges or Conditional Value at Risk. These metrics are deployed either as constraints, or in place of volatility as the risk measurement attached to their return objective. The investment team approximates the actuarial reserve trajectory with assets and derivatives having liability-profiling attributes, including their degree of predictability, liquidity, payment patterns, and policyholder optionality. Diversification has significant visibility, achieved with asset class/factor limits or the math of optimization. Also, management often introduces (statistically or otherwise) additional controls as part of a strong ERM discipline, some of which we've included in the examples in the prior section extracted from our initial EDI paper.

For many years, insurance companies have also had policies that excluded investment in and risk transfer from specific industries such as tobacco. More broadly, values-based investing has gone through multiple incarnations (Socially Responsible, Sustainable, Impact, ESG, etc.) with the ongoing debate on definition, financial return/risk implications, and where fiduciary responsibilities begin and end. Certain behaviors and businesses violate the most fundamental societal norms, and their exclusion from both risk transfer and investment is straightforward. But there will never be complete agreement on standards for all issues. ESG is presently riding a powerful momentum wave but will remain a source of disagreement for some time. The debate is only starting and waiting for a consensus to emerge will be expensive one way or another. EDI V2.0 is an excellent option to incorporate ESG considerations objectively as a customization factor in overall portfolio construction.

Configuring business constraints into the firm portfolio is a necessary step even if involuntary. Active Customization best practices include quantifying the relative importance of the components and avoiding functional bias, redundancy, and omissions, especially issues non-financial in nature but no less critical.

OVERVIEW OF THE ACTIVE CUSTOMIZATION PROCESS: WHO'S CAPTAIN OF THE SHIP?

Despite assembling important metrics in one exhibit, the early process for EDI did not require teamwork. The fictional discussion below is put forward to illustrate how subsequent adoption of the Active Customization approach can foster teamwork and help achieve optimal consensus.

9:00 AM Meeting, CEO Office, The Who's-The-Captain-Of-This-Ship Annuity Company (WCS).[5]

CIO: *"We need to sell some high-grade bonds and buy more equities!"*

CEO: *"Why?"*

CIO: *"The relative values and gap in risk-adjusted total-return trajectories will be historically wide."*

CEO: *"Set up a meeting."*

CIO: *"OK." To herself on the way out..."Can you believe this guy is running the company with a question like that? We're in deep trouble."*

[5] Poutsiaka, W. (2017).; Insights, Weiss Multi-Strategy Advisers, LLC Enterprise Driven Investing for Insurance Companies: The Hot Mess – And Future – of Asset Management.

9:30 AM Meeting:

CRO: *"We need to sell some equities and buy more high-grade bonds!"*

CEO: *"Why?"*

CRO: *"The expected return on capital charges for high grade is substantially higher than for equities, and we need to improve our RBC and debt ratings."*

CEO: *"Set up a meeting."*

CRO: *"OK." To himself on the way out..."Sheesh. Can you believe this guy is running the company with a question like that?"*

10:00 AM Meeting:

CFO: *"We need to sell anything at a gain."*

CEO: *"Why?"*

CFO: *"Our underwriting results this quarter are horrible, and we need earnings to keep our shares from getting hammered."*

CEO: *"Set up a meeting."*

CFO: *"OK." To herself on the way out..."I should be running this company."*

10:30 AM Meeting:

CEO: *"Let me take a wild guess. We need to sell anything at a loss and buy tax-exempts because of the AMT threshold."*

Director of Tax: *"Exactly! How did you know?"*

CEO: *"Pure luck. Set up a meeting with everyone on the senior team."*

Director of Tax: *"Sure thing." To himself on the way out..."Guy's a genius. No wonder he's running this place."*

Even with everyone in the same room, V1.0 did not offer a structured and integrated method to establish customization as another source of enterprise value. Checking all the individual boxes is satisfactory but not impressive implementation. In NII/capital-efficiency-driven shops, decision-makers might evaluate the impact of an investment strategy on their respective other-than-capital business measures to determine if they are **adequate** or not, but not how they are **priced**.

10:30 AM Next Morning: WCS Team Meeting in the Titanic Conference Room

Treasurer, reviewing an updated liquidity stress test: *"Looks fine."*

CFO, commenting on pro forma earnings: *"We're good."*

Similarly, in companies focused on total return (the AI-Runs-Us Mutual Property & Casualty Co. in our case study below) and using optimization, the team is not always aware of how the model estimates/uses significant differences in unit return costs (shadow prices) between constraints. Executives achieve threshold confidence by knowing all requirements adhered to min/max limits, then focus exclusively on small, sometimes statistically insignificant deltas in the investment metrics for making their portfolio strategy selection. As captured in the statement below, the approach feels like excellent execution. But is it?

9:00 AM The AI-Runs-Us Mutual Property & Casualty Company (ARU) Team Meeting in the Machine Learning Conference Room

Chief Data Science Officer, presenting a rebalancing analysis: *"Every portfolio in this graph is optimized and respects all limits. Sharpe ratios peak here and decline slightly further out as the frontier flattens in pursuit of higher returns."*

These processes are not wrong. But they miss significant opportunities, especially with portfolios that are highly customized by choice or external imposition. EDI V1.0 took a step forward by requiring (1) a rank order of importance for critical constraints; (2) performance ranges for each, and (3) the directional impact and pro forma landing spot for each due to a rebalancing.

HOW DOES ACTIVE CUSTOMIZATION WORK IN PRACTICE?

Given the feature weaknesses of the initial procedure and the organizational shortcomings characterized in these conversations, we've updated EDI to a much more executable design, centered on team decisions surrounding the tradeoffs between investment results and portfolio customization on two levels defined by new metrics, C_α and C_λ.

C_α – Customization Infused With As Much Judgement as Statistics

V1.0 highlighted the essential requirement that independent specialists work as one cohesive unit for a common goal but did not give any suggestions on how they do so. C_α rights V1.0's wrong with a well-established framework, known as the Analytical Hierarchy Process (AHP) published by Saaty in 1980.

AHP is a robust decision protocol through which management evaluates the relative importance of multiple variables, in this case for a particular investor, in a way that adds more confidence to a conclusion. It was developed for organizing complex and interconnected group decisions based on math and psychology. AHP has received extensive study, publication, intense debate, advancement through dedicated groups, and widespread application to many fields, including financial services (asset allocation, life insurance, etc.)

As described in Wikipedia, "The method has unique advantages when important elements of the decision are difficult to quantify or compare, or where communication among team members is impeded by their different specializations, terminologies, or perspectives. It is the essence of the AHP that human judgments, and not just the underlying information, can be used in performing the evaluations." These benefits seemed especially relevant, if not ideal, for customizing an insurance portfolio. For this application, which we've named C_α, we see specific benefits:

1. **Industrial strength priority setting**. C_α's creative logic using the "pair-wise" relative-importance technique is more robust than a simple rank-order survey.

2. **High impact collaboration opportunity**. C_α brings together senior management to make business decisions that have a potentially large effect on results and offer growth in members' enterprise awareness and knowledge.

3. **Reduction in errors of omission**. This risk is especially true with business considerations typically not thought of in quantitative terms, such as portfolio-embedded forms of reputational risk.

4. **A building block for C_λ**. We use the weights selected through C_α to determine a company's initial C_λ of 1.0, as outlined in the next section describing this additional AC opportunity.

5. **Judgment and science.** Not one or the other.

But how does C_α enhance existing methods? By preserving all five benefits listed above.

The capital efficiency/NII class of models technically allows portfolio selection without realizing any of the above benefits, although this is rare in practice. Even in pursuit of these benefits, the process can fail to achieve a high standard. For example, it may be self-evident to the WCS team that asset-liability management is more important than liquidity. But is it more important than their recent lackluster GBV (#1 above)? Who decided, and how, which additional factors should shape rather than be consequential measures of portfolio construction (#2)? Where is the ESG score (#3)? These questions are all steppingstones to those we expressed earlier.

Initially, we believed optimization was a partial answer. True, total return portfolio construction through optimization avoids one of the possible customization weak points inherent in some capital efficiency models – e.g., little, if any, modeled inclusion of secondary factors as a design requirement. Optimization reduces this business risk by incorporating constraints into its design of strategies along the efficient frontier. But, unlike C_α, it does not protect all other benefits we've identified and, in some respects, avoids them, especially #5. Judgment sometimes, and properly, plays no role in overriding the

output of quantitative tools. However, judgment should be prominent in other circumstances but remains shut out because of the ease, discipline, and overconfidence in utilizing advanced models. We believe that establishing a portfolio's customization profile is best conducted with models and judgment.

Does retaining all these benefits require the use of specific portfolio construction models and not others? No.

C_α can, and should, co-exist with classic optimization just as it can with capital efficiency as a material enhancement in both instances. In the former case, an efficient frontier that is mathematically optimized is compared to a C_α frontier that is strategically suitable and more transparent, where weights have been determined by judgment, not through formula. Min/max limits are respected in both cases. Comparison of the two risk frontiers and data on the spread in return-cost for comparable alteration of different constraints, frames a valuable discussion. These shadow prices can differ in multiples but remain unexplored, as does constraint calibration in general.

Through this discussion, the team resets their business variable weights[6] in amounts they see as strategically acceptable to minimize the quantitative sub-optimality of their decisions. Sometimes, having humans in the loop working as a unit in this way leads to the addition of new asset classes. Interestingly, the intersection of these two methods can be a C_α set of portfolio options like the initial mean-variance frontier but with more stability due to improved diversification. C_α is extremely well suited for combining judgment and science to reach a superior outcome, as described later in our case study.

C_λ – Calibrating Customization as the Third Portfolio Parameter

While C_α sets a company's customization profile, C_λ compares this profile to portfolio risk and return as a third top-down parameter. To make this comparison and help management select an attractive balance for these key variables, we've designed a mechanism comprised of three steps. Together, they price customization and help leadership go shopping for the right amount.

1. **Calculate a Customization Composite Index (CCI) to measure aggregate customization**. To create the CCI, we first take the requirements selected through C_α, including the secondary investment objective, normalize/scale their native metrics and establish performance breakpoints used for heat map ranges and limits. Next, we calculate the current state of each requirement on its own scale[7]. Finally, as shown with the case study in Exhibit 4, we portray the factors in a column where the total height reflects the CCI score from 1 to 100. CCI is a simple weighted-sum model using the components C_α-derived weights and current-state indexed performance scores. This set-up work is easily described but requires considerable effort to complete initially.

2. **Project the investment opportunity cost, at different CCI levels, with the C_λ sub-model**. We assign a C_λ of 1.0 to the current portfolio. C_λ is a financial gear having potentially significant leverage depending on the circumstances. The executive team varies C_λ which changes all the component scores in concert and by comparable amounts. Component score changes are also directionally consistent, meaning that all will increase the CCI if more customization is being explored. The same holds when testing reduced customization.[8] Component weights and policy limits do not change with C_λ.[9] A waterfall based on the relative component scores at C_λ = 1.0 respect these limits when leverage is being lowered.

   By turning the C_λ dial, management controls, explicitly, the opportunity cost ceiling and, therefore, the risk and return location-range of strategic investment options. Using the preferred portfolio construction method (risk-adjusted return optimization, capital efficiency, etc.,) a new C_λ set point for CCI relocates the portfolio opportunity set extending along the defined risk spectrum. In this way, the tradeoff between the three parameters is transparent and helps narrow the options. The next step assists with the final decision.

3. **Identify, with the Enterprise Ratio (ER), portfolio strategies that balance return, risk, and customization**. If you've made it this far, it's probably apparent we like numbers and pictures, not one more than the other. We settled on CCI's design to also provide a single first-order signal, the ER. In addition to seeing the interaction of investment and customization parameters as described above, we calculate and then combine two values attached to any portfolio to determine the ER. More specifically, we first estimate a portfolio's percentage discount from the maximum projected return subject to asset class concentration limits only, which we call the maximum return reference, to compute an investment score. We use the portfolio's CCI, already normalized on a scale of 0-100 as the customization score. We then calculate the

[6] We modify these weights based on material differences in confidence intervals.
[7] The individual scales will reflect instances when the underlying factor has a non-linear property.
[8] For maximum (versus minimum) limits, a factor performance, and associated heat map/ranges, is converted to 1- score for purposes of computing the CCI.
[9] The factor weights are determined using C_α, and the concentration limits established based on return cost, in both cases as part of the annual strategic review. Weights and limits do not vary with C_λ.

ER as a simple average of the two scores. Using the ER, the appeal of any portfolio's location in purely risk and return dimensions can be assessed in combination with its customization performance. Rebalancing motivated by either side of the business, or both, should at least maintain the ER if not achieve a material improvement. Otherwise, the trade shouldn't clear, as shown in the case study that follows in the next section.

Implementation of C_α and C_λ

AC implementation takes place as follows. Management introduces C_α and CI as integral parts of strategy formulation for the annual Investment Plan. All the standard inputs that precede the strategic discussion remain necessary including affirmation of the investment objective, concentration limits, asset class eligibility and projections, business forecast, maturities, cash flow and others. With these inputs the initial strategic asset allocation version is established. C_α decisions then take place, selecting customization components from a menu[10], and modifying the allocation accordingly. Finally, the team deploys C_λ to select the final form of their strategic asset allocation. As always, subsequent tactical rebalancing triggered by market dynamics remains an option. If management uses a systematic tactical asset allocation process it should include C_λ, but not C_α. Active Customization allows for evaluation of decision-performance based on changes in the ER and in its two components.

We emphasize the essential point surrounding implementation of Active Customization concepts across different model platforms. One of the characteristics we've retained from V1.0 is being agnostic in certain ways. There is no single insurance "industry" approach when it comes to asset management or many other business functions for that matter. There are unlimited ways to run an insurance portfolio even within narrowly defined company groupings. AC implementation mechanics differ accordingly and, other than some of our references to NII vs. total return portfolio construction, we do not detail AC implementation for the wide range of methods in use. However, enhancing any such system with AC is relatively straightforward and expands the opportunity set for business performance without altering other aspects of asset management preferred by executives.

In effect, Active Customization crystalizes in two questions: (1) where should management set weights of importance on the business priorities that impact the portfolio (C_α), and (2) what level of overall customization influence (C_λ) has attractive enterprise value based on the investment opportunity cost?

HYPOTHETICAL STUDY: AI-RUNS-US MUTUAL P&C COMPANY

Now let's look at the AI-Runs-Us Mutual Property & Casualty Company (ARU) more closely as another stylized example.

Conditions in both the investment and insurance markets have been unfavorable for ARU. Their AI models confirm that emerging and underestimated exposures in their core lines are not adequately compensated for in the primary insurance market where pricing, capacity, policy terms, and conditions have not changed and remain widely available to their clients from competitors. On the investment side, low absolute level yields, a flat term structure, weak covenants, negative convexity, and minuscule liquidity/equity/complexity risk premia for most forms of capital have meant "dull" Sharpe ratios and low returns. GBV, their priority corporate financial objective, has been paltry. ARU's CEO calls for an urgent off-site meeting to address the product, investment, and underwriting challenges to meeting their goals and objectives.

9:00 AM ARU Team Building Kick-Off.

CEO: *"Good morning everyone!"*

Everyone's Response: *"It's THEIR fault. It's not MY fault."*

This concluded the Team Building session, so the group moved immediately to Strategy.

CEO: *"How should we update our strategy in light of these poor results?"*

Everyone's Response: *"For crying out loud, THEY should just take more risk!"*

After discussion, management decides to forgo executive bonuses, pay dividends, explore fee businesses, focus on operating efficiencies through innovation, develop a new customer service model, evaluate alternative risk transfer mechanisms, and build better risk tools for both sides of the balance sheet, rather than chase market share and over-valued investment markets. Waiting out "the cycle" is not a strategy.

Unlike competitors, however, the CEO has also decided to bring the **interaction of their two businesses** (insurance and investments) from a second-class, decidedly less headline-grabbing status to a critical role in the execution of their new strategic plan under a new corporate name, The AI-Helps-Us-Property & Casualty Company (AHU).

[10] The menu is comprised of conventional requirements reflecting the company's prominent business attributes, expanded by management to capture the organization's more idiosyncratic strategic priorities.

AHU's primary investment objective is to maximize the 3-year rolling total return, subject to various customization factors, including a secondary NII objective. The investment team uses an optimizer and min/max limits attached to the usual constraints and limits for this type of company. The model has guided management to a generally risk-averse strategy based on their long-term financial objectives and the unattractive investment choices across the board. Accordingly, the AHU CIO has taken negative active weights, versus their model portfolio, in credit and risk assets and eliminated the asset/liability gap, redistributing proceeds in the other asset classes on a proportionate basis.

Over the ensuing year, much more attractive capital market conditions have evolved in the ways they were uninspiring in the recent past. Even without a change in asset allocation, a 1.5% increase of total return is projected over the time horizon, and the secondary NII objective should also gain through bond swaps with decent break-evens, or by rolling maturities into higher yields.

10:00 AM First Anniversary of AHU Senior Leadership Emergency Off-Site

CFO: *"As you can see, our latest projection for GBV is very encouraging!"*

Everyone: *"Time for lunch!"*

CEO: *"Wait. We're not going anywhere yet. Every single one of our competitors is enjoying the same investment benefits. How are we going to differentiate our approach? What about this new AC thing?"*

C_λ for ARU

A year ago, AHU's portfolio structure reflected a high sensitivity to the business requirements as captured in several above-average performance scores at the component level, and an impressive CCI of 85. Low returns in the capital markets explain how this exceptional level of customization was justified – fire sale funding in the form of a very small investment opportunity cost on both an absolute and risk-adjusted basis (bottom left of Exhibit 4[11]).

Portfolio rebalancing offered little incentive at that time. Based on cross-sectional comparisons of long-term risk, return, and covariance, one option was greater exposure to high yield and private equity while extending duration, assuming some asset/liability mismatch permitted by relaxing C_λ from 1.0 to .85. The total return would increase 50 basis points to 2.0%, and NII also improves, while the CCI would drop to a still acceptable and component compliant score of 72. But the Enterprise Ratio, if AC had been in use, would stand still. The marginal increase in **return**, larger increase in **risk**, and the return-proportionate decline in **customization** fail to improve enterprise performance. We call a rebalancing with these characteristics' *enterprise wheel spinning* as confirmed by the forecast Enterprise Ratio.

A materially different story exists at the off-site's first-anniversary meeting (bottom right of Exhibit 4). During the preceding 12 months, the team has made considerable progress on the strategic plan. Also, a correction in the equity market and mark-to-market losses due to widening credit spreads and rising rates have been mitigated by low weather-related losses and enabled a favorable combined ratio, so AHU's binding capital measurement is unchanged. The CCI has persisted at 85. Lowering C_λ from 1.0 to .85 incurs a CCI haircut of 13 points, comparable to a year ago.

But this identical reduction in CCI funds a much more substantial increase in the portfolio contribution. The same rebalancing, unattractive previously on an ER basis, actively raises the portfolio's pro forma return further to 4.75%, closing the gap to the elevated reference maximum of 5.625% and achieving a portfolio score of 84. Projected total return, and NII, will increase markedly. The Sharpe ratio improves. While three of the five customization scores decline unavoidably in this hypothetical example, they remain individually acceptable (heat map) and fund a much more favorable investment contribution. This time, the rebalancing results in an ER of 78, an increase of 9 points on the way to an AC-amplified and peer favorable lift in projected GBV.

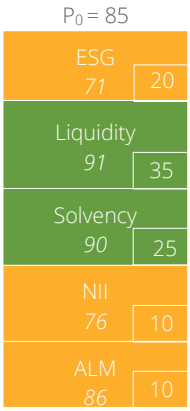
Even when these tradeoffs are intuitive, an explicit quantification and visualization enable more informed decision-making. C_λ and the ER have helped find a better zip code where customization and investment performance should meet. This determination is based on visualization and a new metric (CCI) for the intensity of customization and holistic impact from a portfolio restructuring. The AHU team can next locate the best strategic street address through C_α[12].

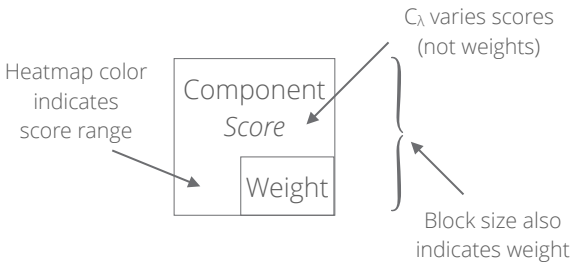
[11] Depending on assumptions, the shift in frontiers may not be parallel.
[12] We've intentionally started with C_λ in this example to highlight its top-down importance.

Exhibit 4

C_λ and Enterprise Ratio (ER)

1. Customization Composite Index

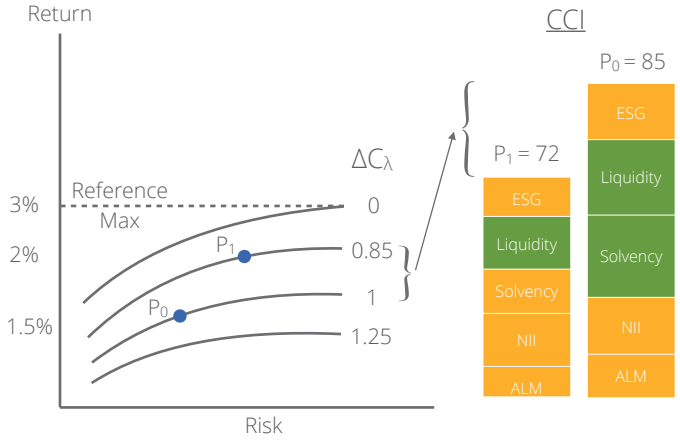




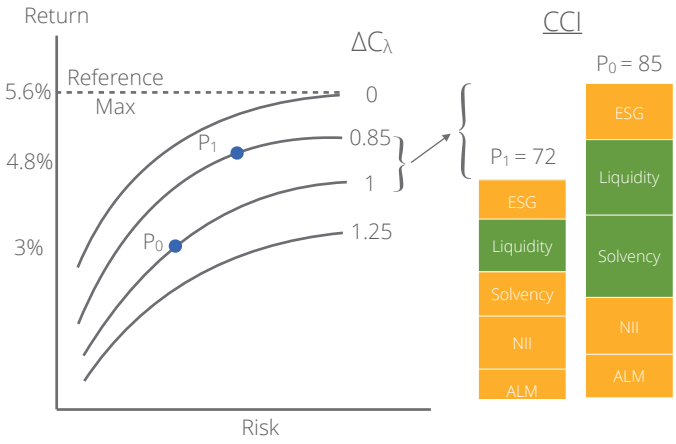
2. Cost of Customization

Change In Attributes:	Investment Portfolio		Customization Portfolio	
	High Yield	↑	ESG	-
	Investment Grade	↓	Liquidity	↓
	Private Equity	↑	Solvency	↓
	Duration	↑	NII	↑
			ALM	↓

Low-Cost Market



High-Cost Market



3. Enterprise Impact

	ER	
	P_0	P_1
Investment Score*	50	67
Customization Score (CCI)	85	72
Enterprise Ratio (ER)	**68**	**69**

	ER	
	P_0	P_1
Investment Score*	53	84
Customization Score (CCI)	85	72
Enterprise Ratio (ER)	**69**	**78**

* Portfolio Return / Reference Maximum

Charts are not to scale. For illustrative purposes only.

12:30 PM

CRO: *"Wow. Reducing C_λ by .15 to .85 increases our projected return by 175 basis points. I'm so glad I suggested it! When conditions reverse, we can increase C_λ to greater than 1, but this is an attractive set point today.*

CIO: *"I've never been so hungry! Let's go eat."*

CEO: *"Hold on. What about customization alpha?*

C_α for AHU

CEO: *"Total-return and NII have improved. But do we like where the model has taken us with the component customization strategy?"*

Director of ESG: *"No. We don't. The model's formula that maximizes total return has only a 20% weight for the ESG component in portfolio design. This weight is the minimum limit we set when ESG started to gain traction, but the total portfolio's ESG score is pitiful at this component weight. It's symbolic, and a non-starter with multiple stakeholders."*

CIO: *"The model is doing exactly what we've asked! It is selling our ESG equity fund due to an expected rotation from momentum to value and dropping our sustainable fixed-income manager because the yield ratio to the Weighted Average Credit Rating is so unattractive that it is unsustainable on a total return basis."*

CEO: *"Here we go again. War in the sandbox. Time for C_α.*

Using C_α, the team resolves these differences through the organized process referenced earlier. As part of this discussion, AHU's investment consultant may be able to source ESG strategies in new asset class sectors not in the portfolio currently that would be diversifying, attractive, and obligate the advisor to recommend when these conditions disappear. The leadership group also considered increasing the minimum ESG weight. The net effect of these changes could be a more strategically suitable portfolio while limiting the cost to mathematical optimality by deploying a more comprehensive set of asset classes. Ultimately, the team decides to achieve several goals by settling on a new allocation to corporate venture capital in direct support of several AHU innovations in their strategic plan, and funding women- and minority-owned start-ups as an important, additional benefit.

5:30 PM

CEO: *"Time for dinner. On me."*

Unlike competitors who went to lunch celebrating higher yields alone, AHU leadership substantially improved financial performance on an enterprise basis by operating as a highly coordinated team to adjust C_λ and better-recognize strategic priorities with C_α. After the executive team of AI-Helps-Us Mutual Property & Casualty Company prematurely celebrated an increase in yields, they took the time to realize significant additional benefits through Active Customization.

CONCLUSIONS AND NEXT STEPS

Active Customization aims to improve corporate performance by expanding the enterprise opportunity set without increasing complexity for the end-user or necessitating an alteration in an insurer's business model footprint. Context does matter—a lot. But AC is a framework that evaluates many strategic pivots related to portfolio customization, accommodating multiple types of construction. Based on learning from more than a few of our mistakes, knowing that the rhythm of convention can distract us from innovation, and understanding where there is real financial leverage we feel there is significant potential with AC for those companies who chose to be more active in this way. As a solid start preceding full implementation, any sensitivity analysis on the opportunity cost of important constraints is well worth the effort.

Active Customization does have drawbacks and open questions. Our incomplete list of issues for future consideration includes the following.

- **False Sense of Precision and Certainty**. AC's foundational philosophy is to inform judgment with quantitative analyses. Nevertheless, like all methodologies that include numerical output, it risks conveying a false sense of precision. An especially hazardous type of this trap is when estimates and projections are received as absolutes rather than informed guesses. In truth, only significant differences in probability-weighted values or changes in output are actionable.

- **Infrastructure**. While some complex statistics and computational operations are required for implementing an AC system, the former can be off-the-shelf, and the latter has become low-cost. Assembling an interactive system with APIs, new programming languages, impressive visual analytics, and cloud-based computing would be straightforward. Commercial

providers[13] have had fully developed AHP (C_a) in place for years, supported by an extensive literature in financial applications of the technique.

- **Heavier Lifting for the Senior Management Team, By Design**. AC is as much a decision framework and management system as it is a quantitative model. Implementation requires a commitment to regularly address multiple new questions, some of which may have been previously answered by machines/algorithms or handled by management episodically, independently, casually, or not at all.

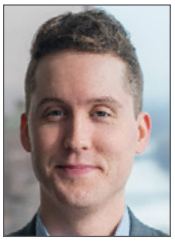
These considerations are the most obvious to us. We expect that others as interested as we are in insurance asset management will enlighten us on the other weaknesses and flaws we have missed and contribute to the healthy debate that continues amongst ourselves on this topic. The history of this industry tells us our 'expectation' will be met. That's how we roll.

Active Customization is a robust and structured methodology that can significantly improve enterprise performance by expanding and clarifying senior management's set of well-defined opportunities. Like other business models it conveys a false sense of precision. Implementation of Active Customization is not a "cookie cutter" exercise and requires more management engagement by design.

We hope that by advancing Active Customization as the key component, our second conception of Enterprise Driven Investing stimulates creative dialogue about finding completely new approaches where insurance leadership integrates financial theory, team dynamics, technology, experience, and judgment to realize better enterprise performance over time.

[13] Despite the passing of Tom Saaty in 2017, vendors such as Northfield Information Services have made AHP based systems available for decades. Numerous academic studies have appeared in investment journals illustrating a range of specific applications in asset allocation, fund selection and wealth management.

About Bill Poutsiaka
Bill Poutsiaka is a senior financial services executive and consultant with considerable depth as CEO, CIO and Board member in the insurance, asset management and fintech businesses. As SVP & Chief Investment Officer of AIG Property Casualty, Bill established an effective global CIO function and contributed to the company's overall recovery, working closely with other members of senior management. From 2005 to 2010 Bill served as an active director on the boards of public, private and non-profit organizations and designed an investment adviser dedicated to managing equities owned by insurance companies. From 1999 to 2005 he was Chief Executive Officer of PanAgora Asset Management, a leading quantitative institutional investment advisory firm. Bill was at Arkwright Mutual Insurance Company from 1989 to 1999, starting as Senior Vice President of Investments, promoted to President in 1993, then President and CEO in 1994. Bill designed and effected the merger of Arkwright with principle competitors to create FM Global, the definitive world leader in commercial property insurance and associated risk management.



About Charles S. Crow IV
Charles Crow is a senior hedge fund portfolio manager specializing in statistical arbitrage and multi-asset class strategies. He is the Co-Founder and Steering Committee member of the Quantitative Research Colloquium sponsored by Morgan Stanley. Previously, he was the Chief Data Scientist, a Portfolio Manager and Partner at Weiss Multi-Strategy Advisers, LLC. At Weiss, he created and managed a team of Data Scientists and was a member of the Allocation and Risk committees. Previously, Charles was a Vice President in Quantitative and Derivatives Strategies at Morgan Stanley. Additionally, he designed and implemented an automated market-making system at ArtIsoft, Inc. Charles holds a B.S. in Computer Science from Johns Hopkins University and an M.S. in Operations Research from Columbia University.

About Dan diBartolomeo
Mr. diBartolomeo is President and founder of Northfield Information Services, Inc. Based in Boston since 1986, Northfield develops quantitative models of financial markets. He sits on boards of numerous industry organizations including IAQF and CQA, and is a director and past president of the Boston Economic Club. His publication record includes forty-five books, book chapters and research journal articles. In January of 2018, he became editor of the Journal of Asset Management. In the ESG/SRI area, Dan has been a judge in the Moscowitz Prize competition since inception. In addition, Dan was a Visiting Professor at Brunel University and has been admitted as an expert witness in litigation matters regarding investment management practices and derivatives in both US federal and state courts.

About Lawrence Pohlman
Lawrence Pohlman, PhD has a distinguished career covering 30 years of experience in equity, fixed income and asset allocation. He regularly speaks at professional conferences and is widely published in prominent journals. He has taught Investments, Corporate Finance, Fixed Income Management and Advanced Derivatives at Columbia Business School, Northeastern University and University of Massachusetts Boston. Larry was the Director of Research at BMO Global Asset Management, Chief Investment Officer at BNP Paribas Investment Partners, Director of Research at Wellington Management, Director of Research at PanAgora Asset Management, Director of Fixed Income Research at Independence Investment Associates, Vice President at Blackrock Financial Management and Associate in Mortgage Securities Research at Goldman Sachs & Co. He holds 5 degrees (BS Nuclear Engineering, MS in Operations Research, MBA Finance and Management Science, MPhil Finance, PhD Finance) from Columbia University and is a member of the American Finance Association, Boston Security Analysts Society, Econometric Society, the Chicago Quantitative Alliance, QWAFAFEW and MENSA.