Understanding Ensemble Active Management:
Innovation in Action

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Last September, this article's three authors were Contributing Editors to a new White Paper published by the EAM Research Consortium ("*Ensemble Active Management – The Next Evolution in Investment Management*"[1]) which introduced the public to the breakthrough potential of Ensemble Active Management ("EAM"). The Paper explained how EAM Portfolios are the result of applying time-tested "Ensemble Methods" (a core component of Artificial Intelligence ("AI") and Machine Learning for decades) to the high conviction stock selections of actively managed portfolios, and that the superior performance for EAM Portfolios are both repeatable and persistent.

The EAM White Paper focused on the *AI and mathematical principles* enabling EAM, while also presenting as evidence the output of the White Paper's massive database. In particular, the White Paper provided an in-depth explanation of how applying Ensemble Methods techniques results in a **multi-expert approach to stock selection** versus the traditional single-expert model, and how a multi-expert foundation generates a structural improvement in the predictive accuracy of stock selection, and correspondingly translates to superior returns.

The White Paper did not, however, include a comprehensive discussion of the time-tested *investment principles* that explained how, and why, EAM Portfolios performed as well as the White Paper demonstrated. This article is designed to address that omission.

There is no question that the data in the White Paper is noteworthy[1]. As shown in the table to the right, the 30,000 EAM Portfolios delivered an **average annual *excess* return of 340bp**, which was sufficient to enable the EAM Portfolios to

Probability of Outperforming and Annual Excess Returns		
Rolling 1-Year Periods	% of Time Outperformed	Annualized Excess Return
EAM Portfolios vs S&P 500 Index	72.3%	3.4% (340 bp)

eclipse the S&P 500 in 72% of the rolling 1-year periods from July 2007 to December 2017, after fees[2]. This compares to a disappointing 16% success rate for Large Cap equity funds[2] versus the S&P 500.

To be clear, Ensemble Active Management is not a strategy, nor an algorithm, nor an overlay. Instead, it is an innovative application of proven technology and creative problem solving to the means of constructing and delivering traditional investment portfolios. These innovations create independent value-add, but also position **EAM Portfolios to solve a near-fatal flaw that is preventing traditional active managers from achieving their very straight-forward mandate: outperform their benchmarks after fees**.

The investment principles that EAM Portfolios draw upon are proven, time-tested concepts such as an added layer of diversification to reduce risk, tail risk management to protect investors from undue harm, and emphasizing a manager's high conviction Best Ideas. And while the EAM performance results are clearly impressive, they neither violate well-established investment precepts nor the laws of gravity.

Importantly, the adoption of EAM techniques is a viable option for virtually every developer of active investment solutions, without unacceptable disruption of organizational dynamics and without significant capital investment. Additionally, these benefits are available to many institutional-caliber consumers and distributors of active management, and in some cases offer the potential for significant business profit.

**ENSEMBLE ACTIVE MANAGEMENT: INNOVATION REJUVENATING ACTIVE MANAGEMENT**

If EAM Portfolios can deliver upon their early promise, then Ensemble Active Management is nothing less than the 'disruptive innovation' for which the active industry has desperately been searching for well more than a decade, and a legitimate means to redefine the competitive balance between active and passive management.

Such a breakthrough cannot come fast enough for the active management industry. Over the past 5 years alone, active managers have suffered more than $750 billion in net outflows, while passive managers have garnered $1.3 trillion in new flows[2]. But these flow numbers are more than bad optics. The net outflows have cost active investment firms an estimated $6.5 billion in cumulative profit since 2014.

The cause for these outflows is not a mystery. A reliable metric for persistency of investment value-add is the ability to outperform over rolling time periods. Figure 1 below shows the success rate for Morningstar's US Active Fund Large Blend group average versus the S&P 500 Index over rolling 1-, 3-, 6-, and 12-month time periods. The data covers the 3-year period 2016 to 2018[3]. The outcome is not encouraging.

- For rolling 1-month periods, active Large Blend funds outperformed only 25% of the time, with an average monthly shortfall of -0.2%.
- For rolling 3- and 6-month periods the success rate dropped to 9% and 3%, respectively.
- For rolling 1-year periods, the Large Blend funds never outperformed, with an average underperformance of -1.9% per annum.

Figure 1. Percent of Rolling Periods that the Average Actively Managed Large Blend Fund Exceeded the S&P
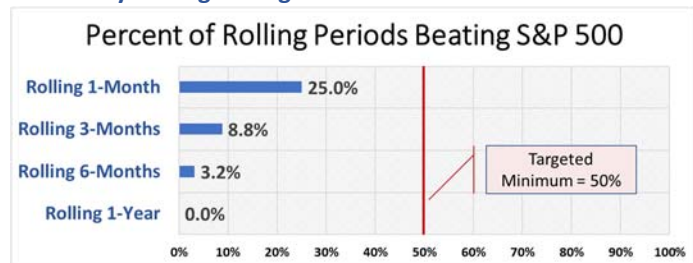
BRIEF SUMMARY OF KEY CONCEPTS TO BE COVERED IN THIS ARTICLE

The facts are fairly overwhelming that active managers, in the main, need to improve upon their performance to fulfill their value proposition and validate the faith that has been entrusted to them by investors.

As will be detailed in this Article, one proven means of improving performance is by committing a substantial portion of the portfolio to the high conviction Best Ideas of managers. While this concept makes intuitive sense, it is rarely implemented because *over-concentrating* into a manager's Best Ideas triggers an unacceptably high risk of massive relative performance failures.

The industry has responded by adding a large number of stocks to the portfolio whose contribution is more for risk management and tracking error management than alpha generation. The unfortunate, and sadly ironic, problem with this approach is that while it reduces portfolio risk, it *simultaneously dilutes returns*. And the dilution puts the managers right back where they started, needing to improve performance.

EAM Portfolios take a different approach to managing portfolio risk. As will be shown, **EAM Portfolios embed a second layer of diversification into the portfolio – at the investment strategy level**. This creates a novel dynamic, and is a direct consequence of the EAM Portfolios' multi-expert foundation.

The second layer of diversification is so successful in reducing negative tails that an EAM Portfolio can deploy a high concentration into Best Ideas. In fact, **they are able to achieve a true Best-Idea-Centric portfolio design**.

The benefits are many. First, the Best-Idea-Centric portfolio translates to a substantial increase in expected client returns. Second, the Ensemble Methods process results in an improved predictive stock selection 'engine', which also adds to performance. Finally, the superior risk management arising from the added layer of diversification translates to a portfolio with statistically lower risk of relative performance failure.

KEY DEFINITIONS

This Article will rely heavily on the following definitions. Figure 2 visually depicts several of these terms:

Figure 2: Alpha Engine, Beta Anchor, and Best-Idea-Centric Portfolio
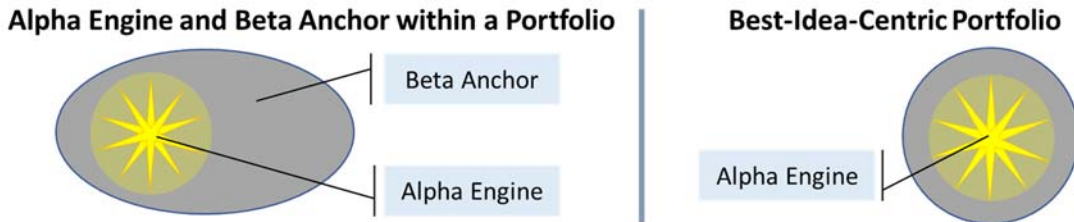
Alpha Engine: Term refers to the portion of an investment portfolio that reflects a manager's high conviction security selections, or their so-called 'Best Ideas'. Substantive industry research (and general common sense) indicates that a manager's high conviction Best Ideas are the most important and reliable source of their excess return[4]. These securities can be identified by their relative overweight positions versus the benchmark, and collectively, the overweight positions represent the manager's **Alpha Engine**.

Beta Anchor: While managers will build their portfolios around their **Alpha Engine**, the average US equity fund will hold nearly 100 additional securities that are not part of the **Alpha Engine**[5]. By definition, these securities play a different role than purely alpha production. Typically, they deliver excess diversification for the purpose of overall risk management, tail risk management, and tracking error management. Our research shows that the **Beta Anchor** will typically represent 50% - 75% of a US equity mutual fund.

Best-Idea-Centric Portfolios: Based on our research, active US equity fund managers typically limit their **Alpha Engine** to 20-25 stocks. While the 25th 'best idea' is unlikely to be superior to the manager's 10th best, there is no question that few if any managers have an asymmetrical information advantage such that their 75th best idea has more than a random chance of outperforming. Therefore, it would logically follow that an optimal active portfolio should be designed such that the manager's Best Ideas in their **Alpha Engine** dominate the portfolio. We define such a portfolio as **Best-Idea-Centric**.

Toxic Tail: Term applies to return distributions, specifically to negative performance outliers. While explicit metrics defining a **Toxic Tail** do not exist, a reasonable standard is when the relative performance over a 12-month period is so much worse than the benchmark that the client is substantially harmed and the manager is at high risk to be fired. We will define the **Toxic Tail** threshold in this Article as when, for a rolling 1-year period, the bottom 5th percentile of a relative return distribution is -1,000bp or worse.

THE VALUE PROPOSITION OF ACTIVE MANAGERS, INCLUDING RISK MANAGEMENT CONSTRAINTS

While the primary component of an active manager's mandate is well understood – outperform the benchmark after fees – what is less frequently discussed, but no less important, is a critical risk constraint that is a pre-requirement for allowing a portfolio to be marketed to the public. This constraint can be viewed as a portfolio manager's version of the Hippocratic Oath – "first, do no harm (to investors)". In brief, this risk constraint means to avoid a portfolio design that has a reasonable chance of triggering a Toxic Tail.

Thus a manager has the challenge of delivering reliable outperformance after fees, but must do so while limiting the potential for periods of significant underperformance. In practice, this has proven to be a daunting task.

BEST-IDEA-CENTRIC PORTFOLIO DESIGN – AN ASPIRATIONAL BUT ELUSIVE OBJECTIVE

Referring back to the Key Definition section, the concept of a Best-Idea-Centric portfolio appears as a straightforward and common-sense approach to portfolio design. Further, mirroring the logical rationale of Best-Idea-Centric portfolios, academic research has shown that Best-Idea-Centric portfolios statistically result in increased expected returns, and thus have a higher potential to outperform. Some of the studies have focused on portfolio concentration to validate this concept[6], while others have built upon the premise of Active Share as introduced in the 2007 paper by Cremers and Petajisto[7].

And yet, Best-Idea-Centric portfolios are the exception, not the rule.

Which begs the obvious question: If the Alpha Engine is the primary source of a manager's excess return, and portfolios dominated by the Alpha Engine (i.e., Best-Idea-Centric portfolios) have higher expected returns, then why are such portfolios so rarely seen?

Answer: True Best-Idea-Centric portfolios carry an unacceptable risk of producing Toxic Tails. They fail the investment managers' version of the Hippocratic Oath, to do no harm to investors.
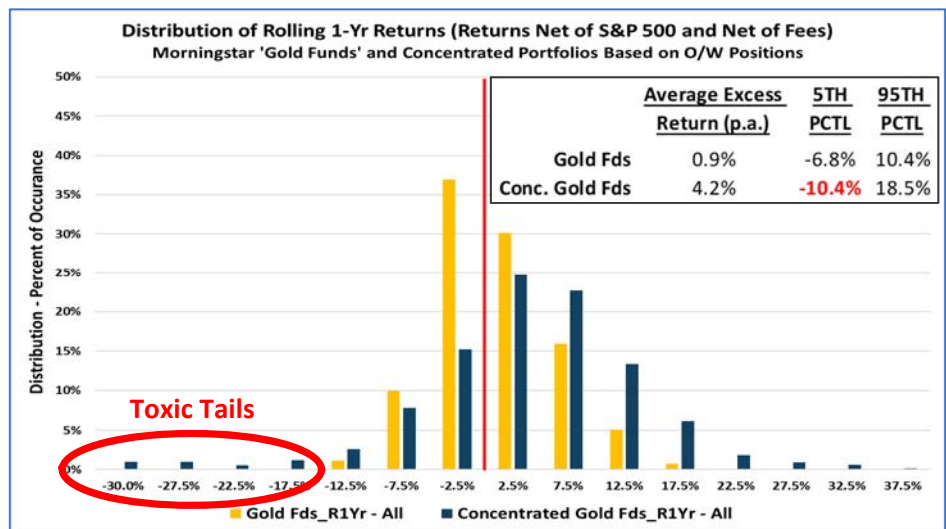
CONCENTRATED PORTFOLIOS AND TOXIC TAILS

What the studies referenced above also validate is that highly concentrated and high Active Share portfolios deliver an unacceptably high risk of Toxic Tail events[6,7]. The investment rationale behind this relationship is grounded in the recognition that managers utilize well-defined investment strategies to inform and drive their security selections. These investment strategies have, by design, *intentional biases* embedded into the decision process reflecting the manager's philosophy regarding the optimal approach to outperform. Unfortunately, when a manager's strategy is out of sync with market dynamics there is a real risk for underperformance. When the portfolio is concentrated, that risk of underperformance is vastly magnified.

For example, if a manager believes that technology stocks are the best long-term means of outperforming the market, their investment portfolio will likely reflect that bias through a technology sector overweight plus a disproportionate over-allocation to technology stocks within their Alpha Engine. It therefore follows that if the technology sector drastically lags the broader market, then that manager is effectively guaranteed to underperform. A concentrated version could easily result in a Toxic Tail event.

This correlation between concentrated portfolios and Toxic Tails is also demonstrated in proprietary research generated by Turing Technology Associates (Figure 3). For this study, Turing evaluated the performance results of 16 Large Cap mutual funds that Morningstar designated as "Gold-Rated" in January of 2017[8], and then constructed 16 concentrated portfolios, that corresponded to all 16

Figure 3: Concentrated Portfolios and Increased Likelihood of Toxic Tails

versions of the Gold-Rated funds, by extracting each fund's overweight positions versus the S&P 500, renormalizing, and then updating every two weeks. The Gold Funds and the corresponding Concentrated Portfolios were compared over rolling 1-year periods from March 2012 to September 2018. *(Note: The Concentrated Portfolios can be viewed as a pure version of each Gold Fund's Alpha Engine.)*

As seen in the table embedded in Figure 3, the Gold Funds did well and delivered an average annual excess return of 0.9%. Due to the risk management benefit of the Beta Anchors, the bottom 5th percentile of the Gold Funds' relative return distribution was limited to -6.8%, and thus did not qualify as having a Toxic Tail.

As research would predict, the Concentrated Portfolios delivered tangibly higher expected returns with average annual excess returns increased to 4.2%. Unfortunately, the concentrated nature of the portfolio also resulted in a substantially expanded negative tail (see red circle in Figure 3), with the bottom 5th percentile of the 1-year returns at -1,040bp, which fails the Toxic Tail test for commercially acceptable investment portfolios.

PORTFOLIO MANAGERS MANAGE THE RISK OF TOXIC TAIL EVENTS BY OVER-DIVERSIFYING

As aspirational as a true Best-Idea-Centric portfolio design might appear, managers cannot justify the Toxic Tail risk that accompanies such a design concept. Instead, they add a 'risk shielding' to the portfolio to protect investors from the 'toxicity' of an undiluted Alpha Engine by adding stocks to the portfolio for purposes of risk management rather than alpha generation.

Figure 4 below shows how the optimal portfolio design, featuring a Best-Idea-Centric portfolio, is commonly 'compromised' through the addition of an over-sized Beta Anchor intended to manage against the risk of a Toxic Tail event.

Figure 4: Impact of Beta Anchor on Optimal Portfolio Design
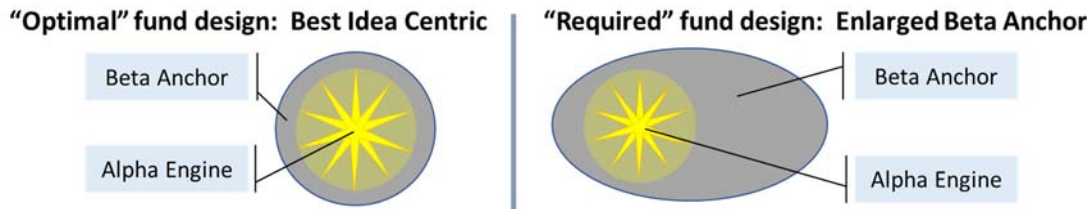
As foreshadowed, there is a cost to an over-sized Beta Anchor. The **Beta Anchor dilutes the net benefits of the Alpha Engine, and thus acts as a drag on client returns**. A simple example demonstrates the impairment in delivered performance incurred by the use of a large Beta Anchor:

Assume a manager's Alpha Engine delivers an undiluted 200bp in annual excess return. Further assume that the fund has a Beta Anchor equal to 75% of the portfolio. The diluted, pre-fee result is therefore 50bp of annual excess return (200bp * (1-75%)). After fees, the clients likely underperformed.

In the prior example, if the Beta Anchor was only 10% of the portfolio then the pre-fee annual excess return would have been 180bp (200bp * (1-10%)), easily translating to an after-fee success.

Looking back to the data in Turing's analysis (Figure 3: Gold Funds versus Concentrated Portfolios), the Concentrated Portfolios generated an incremental 330bp of annual excess return above that earned by the Gold Funds. The only difference between the underlying Gold Funds and the Concentrated Portfolios was the *size of the Beta Anchor*: same securities in the Alpha Engine, same pro rata portfolio allocations, same time periods.

This leads to only one viable conclusion: while the Beta Anchors clearly provided critical risk management benefits, they also substantially diluted net returns delivered to the client.

THE STRUCTURAL DESIGN FLAW PREVENTING ACTIVE MANAGERS FROM ACHIEVING THEIR INVESTMENT GOALS

To summarize, active investment managers and their fund companies have a perplexing dilemma:

- The Beta Anchor is employed as a tail risk management tool by managers to eliminate Toxic Tail events and meet their risk management constraint. *However* . . .

- The Beta Anchor acts as a self-inflicted 'performance penalty' incurred by managers, diluting returns to such a degree that the average active fund fails to outperform its benchmark (a fact in evidence for more than a decade). *However* . . .

- Without the Beta Anchor and the tail risk management it provides, managers are at risk of violating their version of the Hippocratic Oath, and therefore do not have a commercially acceptable offering.

The apparent solution to this nearly intractable challenge has been "safety first": use a full-sized Beta Anchor, and then deal with the consequences of a heavily diluted Alpha Engine. Unfortunately, this is the equivalent of an athlete agreeing to wearing shoes with lead weights in them as part of the terms to enter a race. While the runner will be able to start the race with the other racers, the likelihood of actually winning is virtually nil.

THE ENSEMBLE ACTIVE MANAGEMENT SOLUTION

Figure 5 depicts the mechanical process of constructing an EAM Portfolio. (The discussion assumes the use of underlying mutual funds as the source of the Alpha Engines, however any set of actively managed portfolios can be used.) There are essentially three steps:

- **Step 1** is to extract the Alpha Engine from multiple, independent funds. It is important that the funds be unique, with independent investment strategies and biases. A "full-Ensemble" will use 10 or more funds, but a "mini-Ensemble" with even 2 or 3 funds generates tangible benefits.

- **Step 2** is to combine the Alpha Engines through Ensemble Methods techniques. This step creates a **multi-expert foundation** for the final investment portfolio, and **introduces a critical second layer of diversification into the portfolio design: diversification at the investment strategy level**.

- **Step 3** is to construct a new, enhanced Alpha Engine from the integration of the underlying funds' Alpha Engines, and insert the enhanced Alpha Engine into a new portfolio **with minimal (or no) Beta Anchor**.

Figure 5: Visual Depiction of Ensemble Active Management
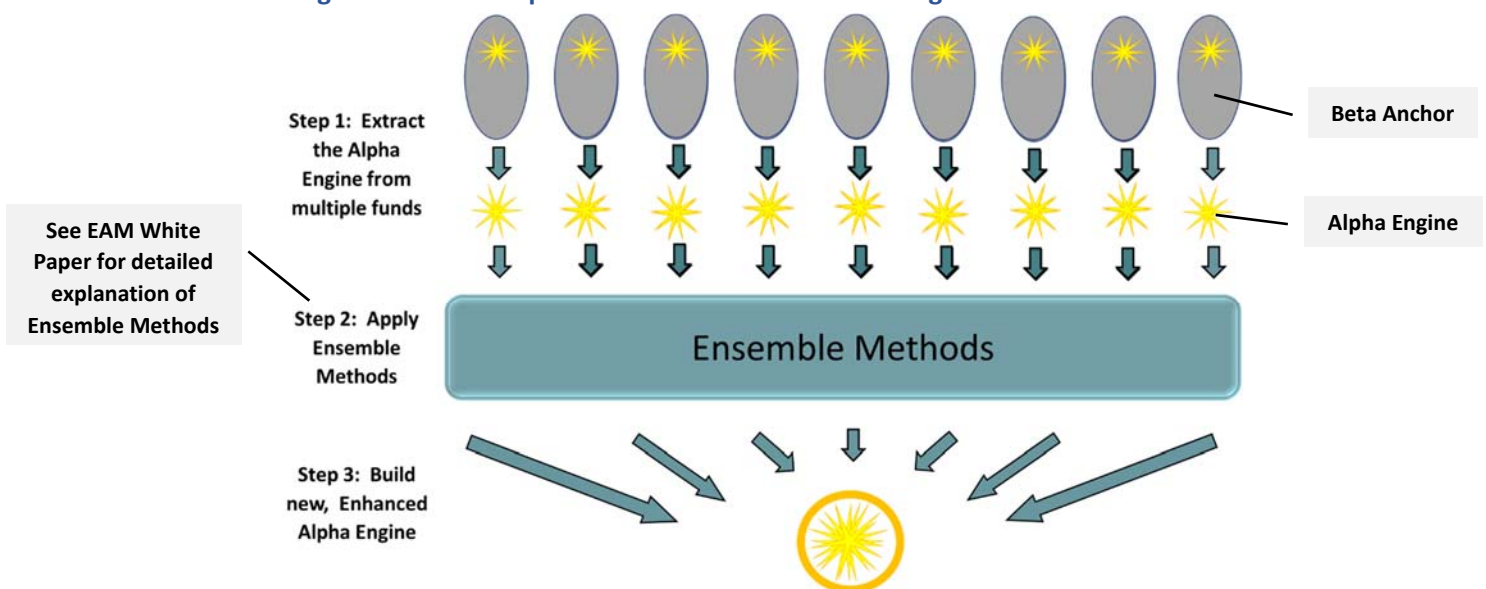
EAM's Investment Principle #1: Added Layer of Diversification Reduces the Risk of Toxic Tails.

Diversification is one of the most time-tested investment tools available to portfolio managers. It reduces overall portfolio risk by eliminating or reducing non-systematic risk, and also reduces the dispersion of return distributions. Traditionally, diversification is introduced to portfolios at the security level. **Ensemble Active Management injects a *second layer* of diversification – at the investment strategy level.**

The integration of multiple independent investment strategies through the application of Ensemble Methods techniques allows diversification of individual managers' biases, and substantially reduces the potential for Toxic Tail events.

To demonstrate, Turing built an EAM Portfolio as part of the Gold Fund analysis discussed earlier (Figure 3 and surrounding text). The Concentrated Portfolios were effectively the extracted Alpha Engines from the underlying 16 funds, and represented Step 1 in Figure 5 above. The Alpha Engines were then combined into an integrated portfolio (Step 2), which also embedded the second layer of diversification. Finally, the new, enhanced Alpha Engine was integrated into a discrete investment portfolio of 50 stocks (Step 3).

Figure 6 visually depicts the probability distribution of the Gold Funds, the Concentrated Portfolios, and the EAM Portfolio (built from the 16 Gold Funds) over rolling 1-year periods.

- **Gold Funds** (top chart) had a high concentration of results with relative performance centered in a band of +/- 500bp (67% of events), and limited breadth of tails (width between dotted lines).

- **Concentrated Portfolios** (middle chart) shifted results to the right (indicating improved average returns), BUT had clearly expanded tails which spread from -30% to 40% (see expanded breadth between dotted lines), had significant exposure to Toxic Tail events (5.1% rate), and suffered multiple events with 'extreme' Toxic Tails of more than a -20% shortfall.

- **EAM Portfolio** (bottom chart) dramatically compressed the breadth of the tail distribution (reduced width between dotted lines), shifted results even further to the right due to improved returns (88% of the outcomes in positive territory) AND incurred no Toxic Tails.

The conclusion is clear: The EAM Portfolio's added layer of diversification at the investment strategy level, a structural result of the EAM construction process, was able to more effectively reduce negative tail risk than the industry's historical approach of relying on an enlarged Beta Anchor.

Figure 6: Probability Distributions
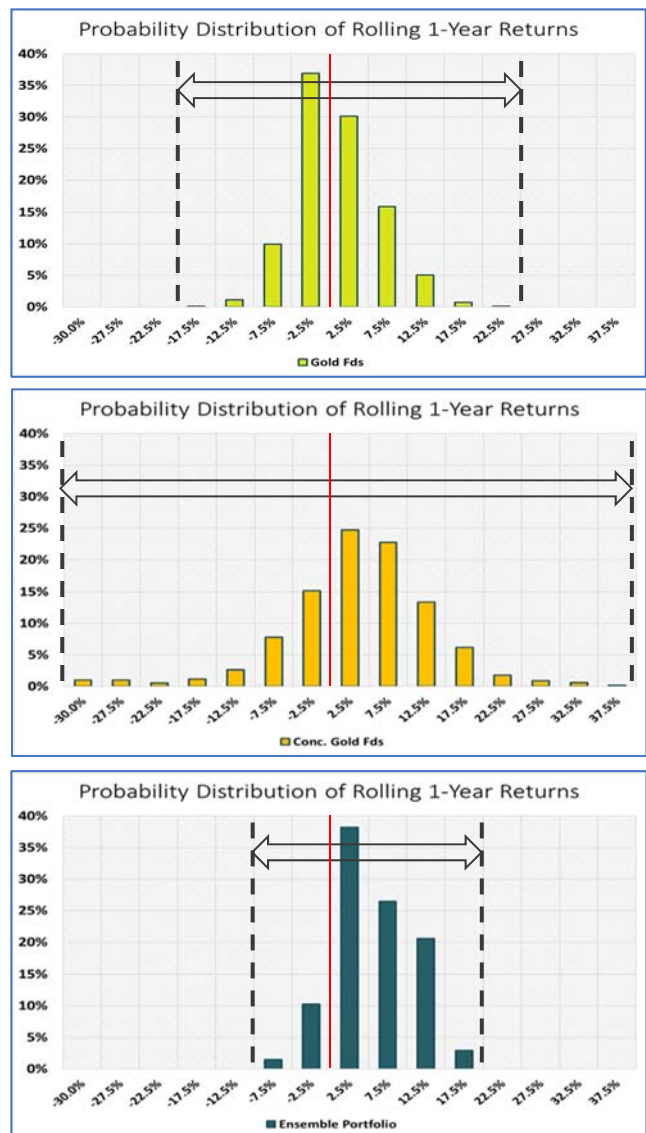
EAM's Investment Principle #2: A Best-Idea-Centric Portfolio Increases Excess Returns.

As discussed previously, the concept of a Best-Idea-Centric portfolio is not only common sense, but it has also been shown through myriad research efforts to improve expected returns. This paradigm is also supported by some of the world's most highly regarded investment professionals:

- **Warren Buffet:** "Wide diversification is only required when investors do not understand what they are doing."

- **Adam Smith:** "Sweet are the uses of diversity, but only if you want to end up in the middle of an average." – *The Money Game, 1968.*

- **Stanley Druckenmiller:** "Diversification is the most destructive, over-rated concept in our business."

Unfortunately, while Best-Idea-Centric portfolios may be desired, it has been shown that traditional portfolio managers, using industry-standard portfolio construction techniques, cannot utilize a Best-Idea-Centric portfolio design because of the unacceptable risk of Toxic Tail events. Fortunately, EAM Portfolios can.

The additional layer of diversification embedded within EAM Portfolios curtails the risk of Toxic Tail events *at the Alpha Engine level.* **This means that an EAM Portfolio can be constructed as a true Best-Idea-Centric portfolio,** *without the dilutive impairment of a Beta Engine.*

Taking a final look at Turing's Gold Fund analysis, we will this time focus in on relative performance results. Figure 7 shows an expanded relative performance table from that originally shown in Figure 3, this time including the EAM Portfolio results.

Figure 7: Improved Performance from EAM's Best-Idea-Centric Portfolio Design

Table of key results for rolling 1-year returns, net of fee and benchmark returns

	Average Excess Return (p.a.)	Tracking Err - Min	Tracking Err - Max	MIN Excess Return (p.a.)	5TH PCTL	95TH PCTL	MAX Excess Return (p.a.)
Gold Fds	0.9%	2.2%	6.7%	-18.2%	-6.8%	10.4%	20.1%
Conc. Gold Fds	4.2%	2.8%	**11.5%**	**-29.6%**	**-10.4%**	18.5%	37.1%
Ensemble Portfolio	**5.5%**	**4.3%**		**-6.2%**	**-3.2%**	**13.0%**	**16.9%**

Key takeaways:

- **Gold Funds** on average delivered an annual outperformance, after fees, of 0.9%. Far superior to the average Large Cap mutual fund.

- The **Concentrated Portfolios** delivered an average excess return of 420bp, which improves upon the Gold Funds' results by 330bp. Of course, this gain in average performance came at the cost of a significant risk of performance failure.

- The **EAM Portfolio** achieved 550bp in annual excess returns.

  - This outperformance reflects 90bp excess return of the Gold Funds, *plus* the additional 330bp increase delivered by the Concentrated Portfolios, *plus* an *incremental* 130bp.

  - This latter 130bp gain is ascribed to the enhanced predictive security selection engine resulting from the application of Ensemble Methods, and the creation of a multi-expert system (the mechanics behind Ensemble Methods is described in detail in the EAM White Paper).

> **This second conclusion is also clear.** EAM Portfolios leverage the superior tail risk management created by the added layer of diversification into an optimal portfolio design: A Best-Idea-Centric portfolio with minimal Beta Anchor. Without the dilutive effect of a Beta Anchor, the increase in expected returns from a true Best-Idea-Centric portfolio design is delivered directly to the investor.

MAPPING EAM'S INVESTMENT JUSTIFICATIONS AGAINST THE EAM WHITE PAPER'S FULL DATA SET

To close the loop on the application of these investment principles and their translation to repeatable and persistent performance benefits for EAM Portfolios, we will verify that they are consistently supported by the full 30,000 EAM Portfolio data set built for the White Paper. For reference, the White Paper randomly constructed 30,000 groupings of funds ("Fund Clusters") of 10 funds each, and then from each Fund Cluster constructed an EAM Portfolio. The resulting portfolios were evaluated on rolling 1- and 3-year periods from July 2007 through September 2017, and reflected more than 165 million data points.

Figure 8 shows performance results in terms of the two components of an active managers' value proposition that was introduced earlier, namely relative outperformance after fees, while also maintaining a low risk of Toxic Tail events.

Figure 8: Evaluating the White Paper EAM Data Versus Key Investment Principles

Probability of Outperforming and Annual Excess Returns, net of fees

Rolling 1-Year Periods	% of Time Outperformed	Annualized Excess Return	5th Percentile	95th Percentile
EAM Portfolios vs S&P 500 Index	72.3%	3.4% (340 bp)	-3.5% (-350 bp)	12.2% (1,220 bp)
Fund Clusters vs S&P 500	46.2%	0.1% (10 bp)	-4.7% (-470 bp)	6.8% (680 bp)

As can be seen, even in this massively larger data set, the following results still emerge:

- For 30,000 randomly constructed EAM Portfolios, average annual excess return was 340bp (net of fees).

- The 340bp average annual excess return was powerful enough to translate into a 72% success rate versus the S&P 500, over rolling 1-year periods. This success rate is not only well above the 50% minimum target, it is nearly double that of the (subpar) 46% success rate of the underlying Fund Clusters.

- The EAM Portfolios were not vulnerable to a Toxic Tail event.

CONCLUSION

How can the investment industry leverage these insights? The original EAM White Paper detailed several mechanisms to implement and deliver Ensemble-based solutions. *De novo* solutions featuring a "full-Ensemble" can be launched, but fortunately existing active portfolios can also be readily modified and enhanced to incorporate at least 'mini-Ensemble' elements.

But whether building new investment solutions or upgrading existing ones, the key takeaway should be that **the investment industry needs to treat the construction of the Alpha Engine and the Beta Anchor as *two discrete activities*, and the portfolio design function should have as an *explicit goal* the minimization of the Beta Anchor and its dilutive impairment on performance.**

The new insight is that the requirement for the Beta Anchor can be reduced, or even eliminated, if a second layer of diversification at the investment strategy level can be introduced. **The simplistic beauty of EAM is that it uses a new layer of diversification to de-risk the Alpha Engine *before pairing it with the Beta Anchor*. Therefore the Beta Anchor's role is automatically lessened, its scale can be reduced, and the natural benefits the Alpha Engine can be delivered directly to the investor.**

The fact that the application of Ensemble Methods also generates an enhanced 'Ensemble' Alpha Engine just further validates the potential advantages of Ensemble Active Management.

The importance of these concepts cannot be overstated, as can be seen below in Figures 9 and 10.

Figure 9 shows the two design objectives for the Alpha Engine, reflecting EAM-based insights.

Figure 9: New Paradigm for Designing and Building the Alpha Engine

Alpha Engine Design Objectives	Rationale
Strengthen accuracy and "power" of Alpha Engine	Increases the predictive accuracy of stock selection ➔ Improving returns
Reduce the "Toxicity" (i.e., potential for Toxic Tails) of the Alpha Engine	Reduces risk of Toxic Tails, which allows a smaller Beta Anchor. Smaller Beta Anchor reduces dilution impact on Alpha Engine ➔ Can Dramatically improve NET returns

- The first role of the Alpha Engine (top row) is to drive excess returns. Managers understand this, and engage in a continual effort to improve the effectiveness of their Alpha Engine.

- The new, second role is for the manager to simultaneously work on reducing the "Toxicity" of the Alpha Engine (second row), defined as the potential for Toxic Tails. A reduced risk of Toxic Tails translates to a smaller need for a Beta Anchor, reduced dilution of returns, and, correspondingly, improved performance.

Figure 10 shows the relative impact, on an after-fee performance basis, from 1) increasing the effectiveness and accuracy of the Alpha Engine, versus 2) reducing the 'Toxicity' of the Alpha Engine, and then correspondingly deceasing the percent of the portfolio allocated to the Beta Anchor.

Figure 10: Impact of Increased Alpha Engine Effectiveness vs Reduced Toxicity

Increase in Alpha Engine Effectiveness	Pre-Fee Return	After-Fee Return	Decrease in % of Beta Anchor in Portfolio	Pre-Fee Return	After-Fee Return
1x	50bp	-35bp	75%	50bp	-35bp
1.5x	75bp	-10bp	50%	100bp	15bp
2x	100bp	15bp	33%	134bp	49bp
2.5x	125bp	40bp	25%	150bp	65bp
3x	150bp	65bp	0%	200bp	115bp

The table is constructed by applying the following formula: [After-Fee Return] = [Excess Return of the Alpha Engine] * (1 - [% Allocation of the Beta Anchor]) – [Expense Ratio]. The top line (red type) reflects the starting point. In this case, we assume that the starting variables are as follows:

- Initial annual excess return generated by the Alpha Engine = 200bp.
- Initial Beta Anchor allocation within the portfolio = 75%.
- Expense Ratio = 85bp.

The table can be interpreted as follows:

- It requires nearly a doubling in the effectiveness or 'raw power' of the Alpha Engine to generate a positive annual excess return, and even with a tripling in the strength of the Alpha Engine, it still translates to less than a 100bp annual excess return versus the market.

- Even a very modest decrease in the Beta Anchor size to 50% of the portfolio generates a positive expected net return (after-fees) for the portfolio.

- A 0% allocation to a Beta Anchor (as seen in the "full Ensemble" shown in Figure 7) generates a 115bp annual excess return.

The challenge for the industry is to improve delivered returns to their clients. To accomplish that goal, they need to assess the realistic capacity to either stay the course and attempt to increase the 'power' of the Alpha Engine, or to embrace the new insights from Ensemble Active Management and focus its efforts on reducing the toxicity of the Alpha Engine and shrinking the role and scale of the Beta Anchor.

Based on the evidence presented in this Article, and hard evidence available in the marketplace, we believe the implications are rather clear-cut:

- Given the decades of time and energy that has been committed to the improving the impact of the Alpha Engine, the realistic potential for future improvement has likely reached a point of diminishing returns. Certainly, the likelihood of suddenly doubling the Alpha Engine's raw power is unlikely in the extreme. (And given industry's recent performance results, such as shown in Figure 1, the efforts remain subpar.)

- Evidence is strong, and growing, that through the EAM-driven additional layer of diversification at the investment strategy level, the ability to reduce the toxicity of the Alpha Engine is genuine. Further, since the industry has not focused its attention and considerable resources at achieving this goal, the early returns from such an effort is likely to be quite high.

Ensemble Active Management has generated a number of thoughtful questions, but two tend to stand out.

How is EAM Different from Institutional Investors' Use of Multiple Managers for the Same Asset Class?

A: Institutional investors often diversify at the investment strategy level by hiring multiple managers for the same investment category, and the risk mitigation benefits of diversification will apply with the aggregated likelihood of Toxic Tails reduced. But this approach fails to achieve two of the critical benefits of EAM:

- Institutional investors hire managers with a completed portfolio design, and virtually always featuring a full-sized Beta Anchor. Diversification might improve the distribution of returns, but it cannot reduce the dilutive impact of the multiple Beta Anchors. Thus the **final, aggregated suite of managers will still have too large a commitment to the dilutive impact of Beta Anchors**.

- The application of Ensemble Methods to the extracted Alpha Engines of the underlying funds (see Figure 5) results in the **creation of a brand new, and enhanced, Alpha Engine**. As detailed in the EAM White Paper, it is not the average of the multiple Alpha Engines, instead it reflects a multi-expert solution featuring the "Best of" of the underlying high conviction Best Ideas. This is the proven strength of Ensemble Methods, and this creates a second contribution to excess returns.

Why has it taken so long for EAM to Emerge?

A: This question (with the often implied, but unstated second question of, "If EAM is truly valid and as obvious as appears, why was it not been discovered before now?") is a classic query emerging in the wake of disruptive innovation. We believe that the answer falls into the classic Gordian Knot category – deemed intractable, until the knot is simply cut.

Part one of the answer focuses on the industry-centric obstacles that were in place to preclude discovery:

- Most managers are not fluent in Machine Learning, and Machine Learning experts rarely end up as PM's.

- If a Machine Learning/Ensemble Methods expert looked towards the investment industry for potential applications, the first observation would be that current fund holdings are not publicly available and thus the required raw data that would enable Ensemble Methods applications would be inaccessible.

- Finally, the industry has, for decades, refined the ideal model of portfolio management to reflect a single manager deploying a singular investment strategy. This paradigm has been so heavily reinforced that it

has become dogma, driving everything from marketing strategy to organizational hierarchies. EAM simply does not fit that paradigm.

- o EAM requires the integration of multiple managers into a single portfolio, and the individual contributions of each manager cannot be isolated or tracked within the final portfolio.

But EAM was indeed discovered, and in retrospect three elements needed to come together to spark the required creative insight. First, a professional who was fluent in both traditional investment theory and the mechanics of Machine Learning/Ensemble Methods had to become engaged. Second, it required ready access to historical holdings of dozens of mutual funds (the EAM 'building blocks'). Finally, the question had to be posed in the right manner to trigger the correct solution. In this case, the question posed was "if research proves active managers' Best Ideas add real value, why do most funds fail to outperform?"

As a final point, it is important to recognize that EAM Portfolios are no longer simply hypothetical. There is already an international manager with a live (and strong) EAM track record exceeding 18 months[9]. In addition, private investors in the US have been successfully applying EAM technologies to manage personal assets for more than a year, and we are aware of a number of firms that have already indicated plans to roll out full-scale EAM investment solutions in 2019.

It is our hope that the mainstream investment industry targets 2019 as the year it embraces the concepts powering Ensemble Active Management.

AUTHORS

Alexey Panchekha

In a career spanning nearly three decades, Alexey spent ten years in Academia where he focused on nonlinear and dynamic processes, ten years in the technology industry where he specialized in program design and development, and eight years in Financial Services.

In the arena of Financial Services, Alexey specialized in applying mathematical techniques and technology to risk management and alpha generation. For example, Alexey was involved in the Equity Derivative Trading Technology Platform at Goldman Sachs, and led creation of the multi-asset multi-geographies Portfolio Risk Management System at Bloomberg. He also served as the Head of Research at Markov Process International, a leader in portfolio attribution and analytics.

Most recently, he co-founded Turing Technology Associates, Inc. with Vadim Fishman. Turing is a technology and Intellectual Property company that resides at the intersection mathematics, machine learning, and innovation. Its solutions typically service the financial technology (Fintech) industry. Turing's primary areas of focus relate to enabling technology supporting the burgeoning Ensemble Active Management sector, and enabling technology supporting strategies targeting downside volatility management.

Prior to Turing, he was Managing Director at Incapital, and Head of Research at F-Squared Investments, designing innovative volatility-based Risk Sensitive Investment Strategies.

Alexey is fluent in multiple computer and web programming languages, software and database programs, and has achieved certification in Deep Learning software. He earned a Ph.D. from Kharkiv Polytechnic University, with fields of study in Physics and Mathematics. He also earned an MS from Kharkiv Polytechnic University, focused on Physics. Alexey is also a Chartered Financial Analyst (CFA®) charter holder.

Matthew Bell

Matthew is President of *Bell Family Interests LLC*, a private family office management and consulting firm. Mr. Bell is also an active investor in private companies through direct transactions, and is a Founding Member of the Alamo Angels Network.

Prior to founding Bell Family Interests, he was Chief Investment Officer and Director of Family Office Services for Cross Financial Services Corporation, a Texas-based financial planning and investment management firm. Other key positions included President of Southwest Investment Management, LLC, a Texas-based registered investment advisor firm, and Managing Director of The Trust Company, N.A., a federally chartered trust bank headquartered in San Antonio, Texas. Matthew also formerly served as the President of the Financial Planning Association of San Antonio and South Texas chapter.

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Robert S. Tull, Jr

Bob has been a well-recognized expert in the ETF market since 1993, when he was one of the principals behind the development of WEBS -- the precursor to iShares ETFs. In the ensuing years he has consulting to issuers and governments on ETF infrastructure support, became a named inventor on multiple security patents involving exchange-traded products, and he has played a leading role in the design and development of over 400 exchange traded products in the U.S., Europe and Pacific Rim. Recently, Bob was presented the ETF 2018 Nate Most Lifetime Achievement Award.

Bob is one of the founders of ProcureAM, LLC, and prior to ProcureAM, Bob was the owner and primary consultant of Robert Tull & Company. Prior to launching Robert Tull & Company, he held senior level roles at such firms as Morgan Stanley, Deutsche Bank, where he was Managing Director and COO of Bankers Trust Global Custody, Benefit Payments and Master Trust business units, and the American Stock Exchange LLC (AMEX), where he was Vice President of New Product Development and Executive Director of AMEX ETF Services.

FOOTNOTES

[1]*Information related to the White Paper is used by permission. The Paper is currently available for download free of charge at ensembleactivemanagement.com.*

[2]*The EAM White Paper applied a 94bp theoretical average expense ratio to the returns of the EAM Portfolios.*

[3]*Source: Morningstar Direct.*

[4]*Examples include "Best Ideas" Cohen, Polk, and Silli (2010), and "Diversification versus Concentration . . . And the Winner is?" Yeung et. al. (2012).*

[5]*Average number of holdings for Large Blend mutual funds as of December 2018 is 130, 119 if DFA funds are excluded. Source: Morningstar Direct.*

[6]*Example includes "Diversification versus Concentration . . . And the Winner is?" Yeung et. al. (2012).*

[76]*Examples include "How Active is Your Fund Manager? A New Measure that Predicts Performance" Cremers, Petajisto (2007), and "Active Share and Mutual Fund Performance" Petajisto. (2013).*

[8]*Per Morningstar, their Analyst Rating is the summary expression of Morningstar's forward-looking analysis of a fund. Morningstar analysts assign the ratings on a five-tier scale with three positive ratings of Gold, Silver, and Bronze, a Neutral rating, and a Negative rating. The Gold Rating applies to a Best-of-breed fund that distinguishes itself across the five [Research Methodology] pillars and has garnered the analysts' highest level of conviction.*

[9]*Reference November 8, 2018 press release from Farringdon Asset Management (Singapore based) - "Hiding in Plain Sight: Farringdon Asset Management's Ensemble Active Management Portfolio Beats S&P 500 and Wins Investment Contest. Press release is available through Barry Schwartz, Schwartz PR - barry@schwartzpr.com.*