The Context Machine:
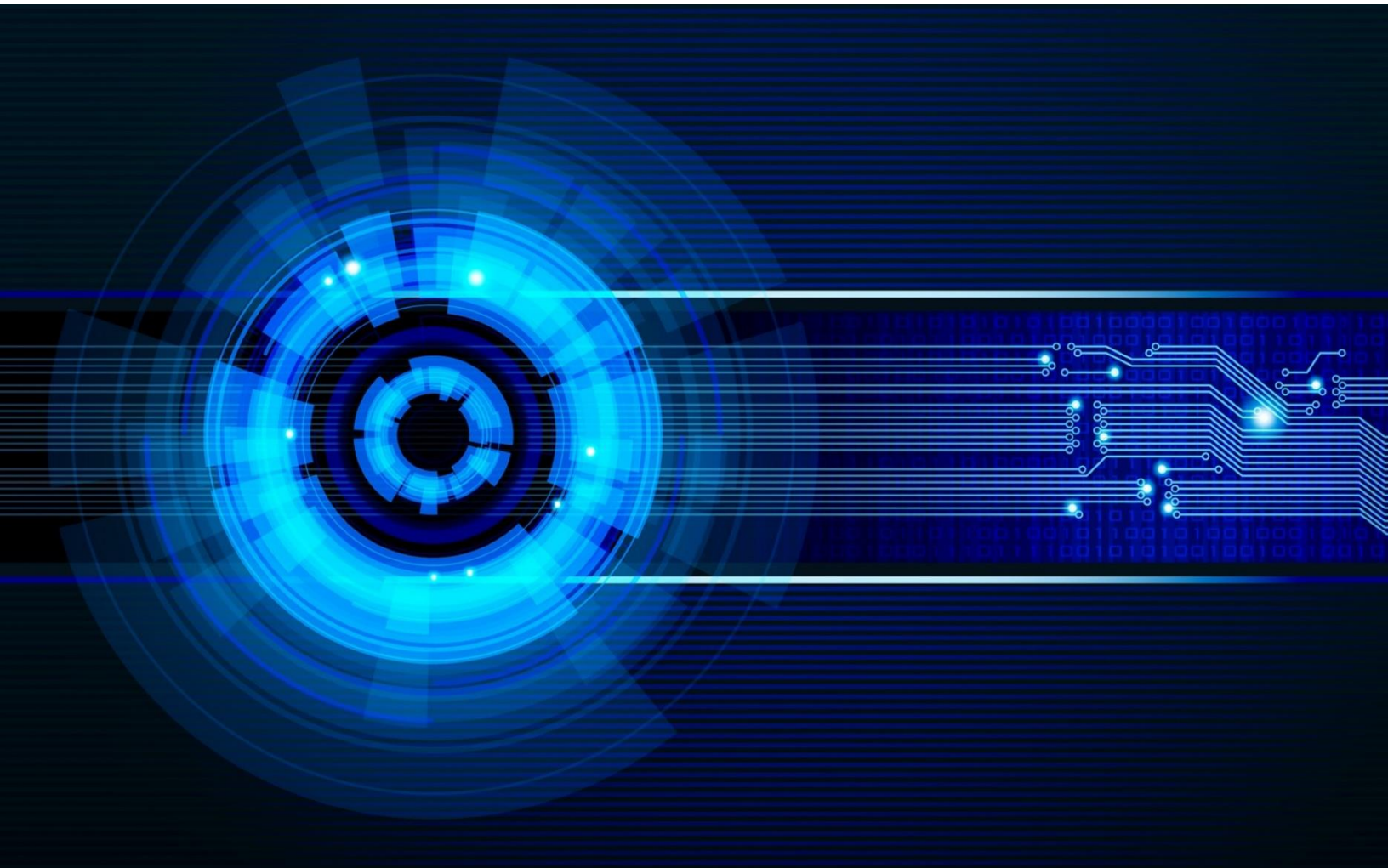
Estimating Asset Manager Technology Spending

Executive Summary

SYNOPSIS

- Technology strategy is becoming business strategy.

- Measuring technology spending amplifies critical navigational intelligence; a term used to specifically emphasize impact for organizational transformation.

- For the asset management universe, current tools to measure technology spending are ineffectual.

- Alphacution has developed a method to estimate technology spending for asset managers for unobservable data and to enhance contextual understanding of observable data.

- This methodology's success hinges on this question: How do managers scale?

- Manager scaling is quantified by the ratio of assets under management (AUM) per employee (e)—known herein as human capital leverage (AUM/e).

- This report offers this hypothesis: There is a persistent relationship between AUM, technology spending, and headcount (e) whereby human capital leverage and technical leverage (TCO/e) move inversely as AUM changes. (In the context of this report, total cost of ownership (TCO) and total technology spending are used synonymously.)

- Factor relationships are persistent because there are only two engines of productivity (IT and human capital), meaning technology spending can be deduced from human capital leverage.

- As AUM changes, new strategy choices may need to be made, and these choices represent the greatest governing impact on the shift in human capital allocations, thereby enhancing the persistent nature of the factor relationships.

- In this study, Alphacution leverages data from 158 companies over the period of 2005 to 2016 to validate its hypothesis and construct a benchmarking framework.

- Study findings offer numerous practical applications to both technology buyers and solution providers as well as a roadmap for the framework's future development.

BACKGROUND

Technology strategy and business strategy are becoming one and the same. Any lingering gaps between them are closing; front-to-back, top-to-bottom and across the entire business segment spectrum. Many firms born in the "analog era" – with deep legacies of high-touch offerings - are rebranding themselves as technology companies.

And yet, for all the promise of the revolutions in artificial intelligence, cloud and big data, attempts to forge a greater understanding of the interplay between technology and business strategy are met with unique challenges. Most players in this ecosystem are still using dulled intelligence tools

to navigate this rapidly changing and increasingly techno-centric landscape. Finding balance between the primary *engines of productivity* – information technology and human capital – continues to be conducted like a game of Marco Polo; searching with little more than a foggy grasp of empirical evidence. Operational alpha is a growing theme among the pantheon of new vernacular in this space that seeks to illuminate such challenges. However, despite its descriptive elegance, operational alpha remains a formative and elusive concept.

Alphacution has set out to influence this dynamic in a new direction, starting with one simple, yet increasingly germane, question: What do banks spend on technology? After all, understanding technology consumption patterns offers unique insights into shifts in both business strategy and operational efficiencies.

Possessing detailed vision and unquenchable desire to eventually move beyond banks, we started there because banks provide more access to financial and operational data than any other player profile in the financial services ecosystem thanks to regulatory filings and other periodic reporting. They also happen to be the largest absolute consumers of technology in the ecosystem, so it made sense as a starting point. In the end, the findings off the back of answering this question generated numerous insights and valuable comparative intelligence about business strategy implementations in the global banking sector.

As such, Alphacution's initial work has already paid dividends in the global banking arena, highlighted by the early development of our T-Greeks operational benchmarking framework – particularly in the discovery of our T-Spread productivity analytic - and the introduction of the concept, *return on technology* (RoT)[1]. We knew from day one that the main challenge in answering this question for the asset management universe was always going to be that they are mostly private - if not, highly secretive - and therefore, accessing the right data was going to present some challenges. How would we answer the question: What do *asset managers* spend on technology?

HYPOTHESIS

But, as it turns out, Alphacution has made a series of new and incremental discoveries; identifying an alternative path that leads to the estimation of technology spending for asset managers. It relies on answering a *different* question: How do asset managers scale? With this question, we are essentially asking about the change in *human capital allocation* as assets under management (AUM) grows – which allows us to utilize data that should be easier to find: AUM and headcount.

Symbolic of its simplicity, this approach is useful across the entire continuum of managers and strategies; even in cases where the most highly-automated methods are being deployed. All strategies need people, but all strategies don't need the same allocation of people for each new dollar of AUM. Asset scaling is strategy dependent; human capital scaling is process dependent. Therefore – as our hypothesis goes - the nature of strategy workflow will be related to the ratio of

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[1] Return on technology (RoT) is quantifiable by normalizing and benchmarking the difference between "productivity" (i.e., total net revenue) and the component cost of that "productivity' (i.e., total technology spending).

AUM and headcount. That ratio – "AUM/e" – should be indicative of the level of automation (or lack thereof) in the underlying strategy. We call this phenomenon *human capital leverage*.
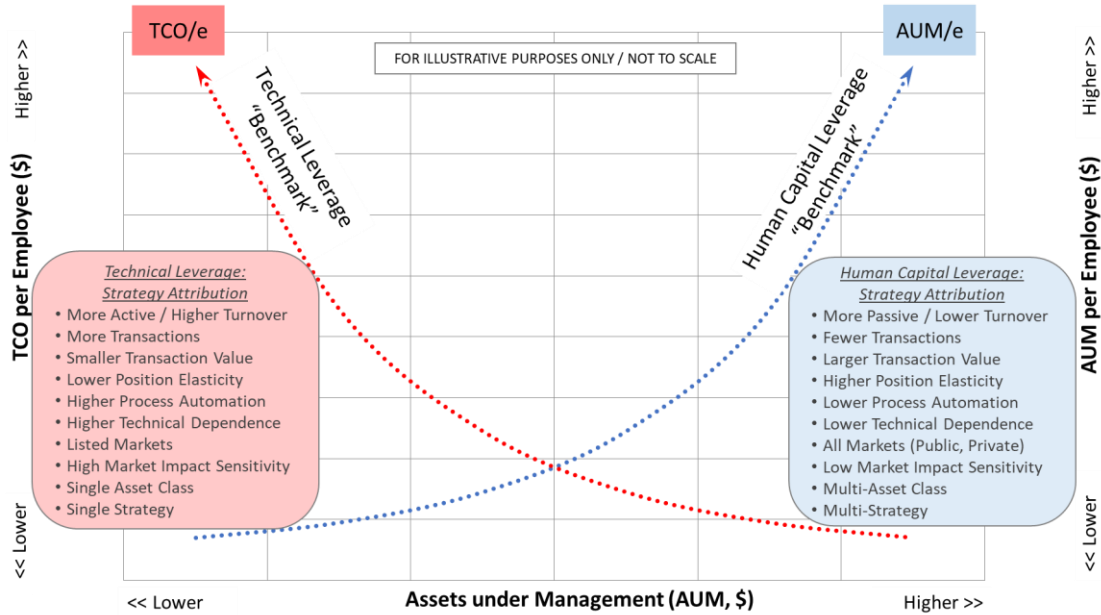
Similarly, we should be able to measure the change in *information technology allocations* as AUM grows with the ratio of TCO[2] per employee (TCO/e). In this case, TCO/e should be indicative of the *technical intensity* of a strategy's workflow – or, *technical leverage*; a measure that is the antithesis of human capital leverage.

Lastly, because information technology and human capital are the primary *engines of productivity* for service businesses, quantifying one of them defines the other, by default. They are two pieces of a whole, and their proportions should move inversely to one another as AUM changes. When AUM/e goes up, TCO/e should go down – and vice versa. And, since accurately quantifying TCO/e for private companies is very difficult without powerful context, we can use the more easily observable AUM/e ratio as a "back door" to deduce TCO/e, thus identifying the answer to Alphacution's original question about levels of technology spending. As we found with banks, it turns out that quantifying and studying these spending patterns is a key to achieving a deeper understanding of numerous critical themes in the space: the evolving array of business models, the highly diverse spectrum of market strategies, and the various immunities to operational risks, among them.

This chain of logic brings us home to the claim that the factors <u>AUM, technology spending, and employee headcount are all related in a persistent manner</u>. With that concept anchored in place, empirical evidence should allow us to define the change in both *technical leverage* and *human capital leverage* with changes in AUM in the form of "benchmarks"; the former being a *cost of productivity benchmark*, the latter being a (*nature of) processing benchmark* (see Exhibit 1). And, as we will demonstrate here, together these benchmarks represent a framework that offers numerous practical applications of what Alphacution calls *navigational intelligence*.

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[2] TCO is defined herein as total annual spending on computer equipment, related infrastructure and purchased, acquired or internally-developed software – and <u>does not</u> currently include related IT human capital costs. TCO and "technology spending" are used interchangeably in this report. It is also important to point out that in its 2016 global bank study, Alphacution refers to two versions of TCO estimation, the version that includes IT human capital costs and the version that does not – otherwise known as non-human capital TCO – or NHC-TCO. We found this distinction to cause confusion, so we abandoned it for this asset manager study in favor of a simpler definition of TCO coupled with detailed footnotes.

EXHIBIT 1: ANNOTATED FRAMEWORK HYPOTHESIS – TECHNICAL, HUMAN CAPITAL LEVERAGE BENCHMARKS

TCO/e

AUM/e

FOR ILLUSTRATIVE PURPOSES ONLY / NOT TO SCALE

Higher >>

Higher >>

TCO per Employee ($)

AUM per Employee ($)

Technical Leverage "Benchmark"

Human Capital Leverage "Benchmark"

Technical Leverage: Strategy Attribution
- More Active / Higher Turnover
- More Transactions
- Smaller Transaction Value
- Lower Position Elasticity
- Higher Process Automation
- Higher Technical Dependence
- Listed Markets
- High Market Impact Sensitivity
- Single Asset Class
- Single Strategy

Human Capital Leverage: Strategy Attribution
- More Passive / Lower Turnover
- Fewer Transactions
- Larger Transaction Value
- Higher Position Elasticity
- Lower Process Automation
- Lower Technical Dependence
- All Markets (Public, Private)
- Low Market Impact Sensitivity
- Multi-Asset Class
- Multi-Strategy

<< Lower

<< Lower

<< Lower

Assets under Management (AUM, $)

Higher >>

Source: Alphacution

In this 48-page, 35-exhibit study, Alphacution goes to new lengths to apply the axiom that effective management requires effective measurement – and begins the process of supporting its hypothesis that there are persistent relationships between trading and operational factors for asset managers. With most asset managers being private, support for this hypothesis also means that technology spending – a rarely observable data item in this universe – can be estimated with more readily observable and contextual data about AUM and employee headcount.

Alphacution has identified 37 public asset managers, hedge funds and private equity firms - along with another 23 bulge-bracket banks with asset management divisions, financial advisors, and a series of proxies (that come to us in the form of broker dealers and market-making firms) – resulting in a total of 60 core models - to test this hypothesis (see Exhibit 2).

EXHIBIT 2: LIST OF ASSET MANAGERS, KEY ATTRIBUTES IN THE CORE MODELING SAMPLE

Manager / Company	Type	Country	FX	Manager / Company	Type	Country	FX
Aberdeen Asset Management plc	Asset Manager	UK	GBP	Invesco, Ltd.	Asset Manager	US	USD
Aegon Asset Management (Aegon NV)	Asset Manager	Netherlands	EUR	Investment Technology Group, Inc. (ITG)	Solution Provider	US	USD
Affiliated Managers Group, Inc.	Hedge Fund	US	USD	J P Morgan Chase & Co (JPAM)	Global Bank	US	USD
AllianceBernstein LP	Asset Manager	US	USD	Janus Capital Group Inc.	Asset Manager	US	USD
Ameriprise Financial, Inc.	Financial Advisor	US	USD	Jefferies Group LLC	Broker-Dealer	US	USD
Amundi Asset Management	Asset Manager	France	EUR	Jones Financial Companies, LLLP (Edward Jones)	Financial Advisor	US	USD
Apollo Capital Management, LLC	Hedge Fund	US	USD	KCG Holdings, Inc.	Market-Maker	US	USD
Ares Management, LP	Asset Manager	US	USD	KKR & Co., LP	Private Equity	US	USD
Aviva plc	Asset Manager	UK	GBP	Lazard Asset Management	Asset Manager	US	USD
Bank of New York Mellon Corp.	Custody Bank	US	USD	Legal and General Group, plc	Asset Manager	UK	GBP
BGC Partners, Inc.	Broker-Dealer	US	USD	Legg Mason, Inc.	Asset Manager	US	USD
BlackRock, Inc.	Asset Manager	US	USD	Man Group plc	Hedge Fund	UK	USD
Blackstone Group, LP	Private Equity	US	USD	Morgan Stanley	Global Bank	US	USD
Brookfield Asset Management Inc	Private Equity	US	USD	Natixis (Global Asset Management)	Asset Manager	France	EUR
Calamos Asset Management, Inc.	Asset Manager	US	USD	Northern Trust Corp.	Custody Bank	US	USD
Carlyle Group	Private Equity	US	USD	Oaktree Capital Group, LLC	Hedge Fund	US	USD
Charles Schwab Corp.	Financial Advisor	US	USD	Och-Ziff Capital Management Group, LLC	Hedge Fund	US	USD
Deutsche Bank AG	Global Bank	Germany	EUR	Old Mutual plc (OMAM)	Asset Manager	UK	GBP
E*Trade Financial Corporation	Broker-Dealer	US	USD	Oppenheimer Holdings Inc.	Asset Manager	US	USD
Eaton Vance Corp.	Asset Manager	US	USD	Platinum Asset Management, Ltd.	Asset Manager	Australia	AUD
Federated Investors, Inc.	Asset Manager	US	USD	Prudential Financial, Inc.	Asset Manager	US	USD
Flow Traders NV	Market-Maker	Netherlands	EUR	Raymond James Financial, Inc.	Financial Advisor	US	USD
Fortress Investment Group, LLC	Hedge Fund	US	USD	Schroders plc	Asset Manager	UK	GBP
Franklin Templeton (Franklin Resources, Inc.)	Asset Manager	US	USD	SEI Investments Company	Asset Manager	US	USD
GAM Holding AG	Hedge Fund	Switzerland	CHF	State Street Corp. (SSGA)	Custody Bank	US	USD
GAMCO Investors, Inc.	Asset Manager	US	USD	T Rowe Price Group, Inc.	Asset Manager	US	USD
Goldman Sachs Group, Inc. (GSAM)	Global Bank	US	USD	Tetragon Financial Group, Ltd.	Hedge Fund	US	USD
ICAP plc	Broker-Dealer	UK	GBP	UBS Group AG	Global Bank	Switzerland	CHF
IGM Financial, Inc.	Financial Advisor	Canada	CAD	Virtu Financial, Inc.	Market-Maker	US	USD
Interactive Brokers Group, Inc.	Broker-Dealer	US	USD	Waddell & Reed Financial	Financial Advisor	US	USD

Source: Alphacution, company data

Supplemental data for the core models comes from a collection of 98 additional asset managers harvested from the US Securities and Exchange Commission's (SEC) Form ADV; a representative sample for which can be found in Exhibit 3.

EXHIBIT 3: REPRESENTATIVE LIST OF ASSET MANAGERS, CORE STRATEGY IN THE SUPPLEMENTAL DATA SAMPLE

Manager / Company	Core Strategy	Manager / Company	Core Strategy
Balyasny Asset Management, LP	Multi-strategy	Maverick Capital	Equity - RV
Bluecrest Capital Management (closed)	Equity	Moore Capital Management, LP	Global Macro
Brevan Howard Asset Management	Global Macro	Renaissance Technologies, LLC	Quantitative
Bridgewater Associates, LP	Quantitative	SAC Capital Advisors, LP (closed)	Multi-strategy
Citadel Advisors, LLC	Quantitative	Third Point, LLC	Event-Driven
D E Shaw & Co, LP	Quantitative	Tudor Investment Corp.	Multi-strategy
Element Capital	Global Macro	Two Sigma Investments	Quantitative
Elliott Management Corp.	Multi-strategy	UBS O'Connor, LLC	Quantitative
Farallon Capital Management	Multi-strategy	Viking Global Investors, LP	Equity
Magnetar Capital	Event-Driven	Winton Capital Management, Ltd.	Quant

Source: Alphacution, company data

The resulting dataset for this study – represented by a grand total of 158 companies - is based on the modeling of three primary factors – technology spending (TCO), assets under management (AUM), and headcount (e) – collected for up to twelve years beginning 2005 and ending 2016, wherever applicable. The resulting story, however, is based on the interplay between two novel analytics: TCO/e and AUM/e.

In the end, Alphacution believes that validating this hypothesis is a dramatic first step towards extending its techno-operational benchmarking framework to key stakeholders in the global asset management universe; one that delivers practical applications that they currently need and do not have. How strong the contextual power is from this initial sample of empirical evidence – and the
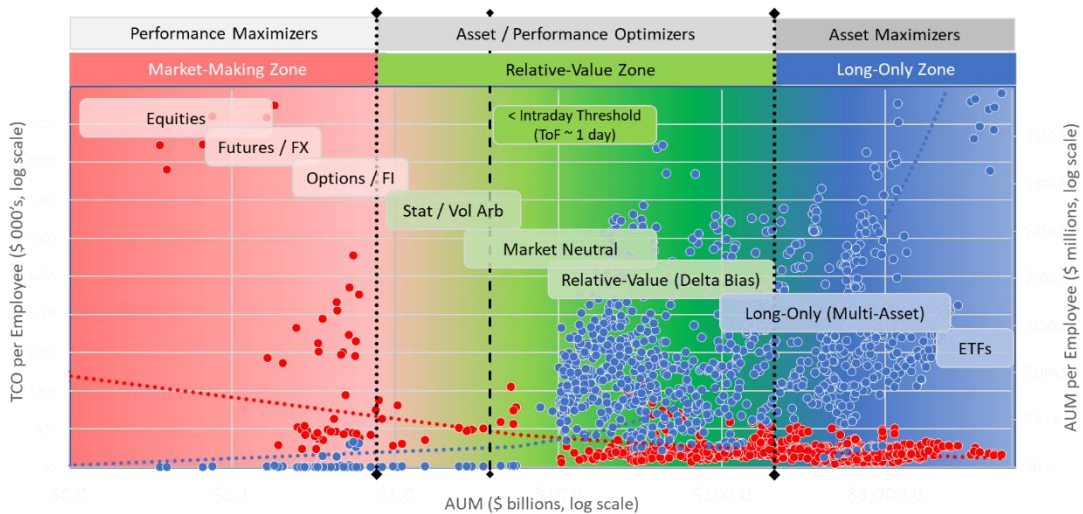
potential to deliver *navigational intelligence* to asset managers, hedge funds and their vendor partners - is what Alphacution begins to expose here.

Rest assured. The days of wild-assed guessing on this topic are coming to an end. Sales enablement efforts and demands for better competitive intelligence tools need not remain in the fog. For students of the game - and we expect there to be many of you - the journey to understanding the possibilities brought by this version of Alphacution's framework is a fascinating one, and the view out of the windshield from there is better yet.

Like the methods for solving a Sudoku puzzle, this work results in the creation of a context machine – and its implications for optimizing the human–technology capital mix for specific managers and within specific strategies is worthy of attention. In parallel, it turns out that this framework is also a *map*. And, with the development of increasing contextual powers, Alphacution can make a rather bold claim: This map provides an increasingly specific "location" for *every* manager in the global asset management universe, no matter the strategy and no matter how secretive (see Exhibit 4).

Stop guessing. Learn how…

EXHIBIT 4: CONVERTING FRAMEWORK INTO MAP OF STRATEGY CATEGORIES, MANAGER COORDINATES

Source: Alphacution, SEC, company data

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ABOUT

ALPHACUTION RESEARCH CONSERVATORY

Alphacution Research Conservatory, LLC (Alphacution) is the first digitally-oriented research and strategic advisory platform uniquely focused on 360° modeling, measuring and benchmarking for technology spending patterns, and the operational impacts of those investment decisions, in and for the global financial services (FSI) ecosystem. Founded by market veteran Paul Rowady, the Alphacution platform is specifically designed to deliver *data-driven* and *navigational* intelligence for financial information, analytics and *techno-operational* themes related to FSI – including its T-Greeks Benchmarking Framework - to an institutional client network by leveraging multi-modal communication and other digital-era tools, technologies and methods in the development and delivery of its products and services. More information can be found at www.alphacution.com. Please send inquiries to info@alphacution.com and follow @alphacution.

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Paul Rowady is the Founder and Director of Research for Alphacution Research Conservatory, a company originally established in 2004 to develop visually-intensive trading and research systems. Prior to this, Paul spent 7 years with capital markets consultancy, TABB Group, where he was most notably the founding principal of its technology, analytics and data advisory practice. In total, Paul has nearly 30 years of research, technology, capital markets and proprietary trading experience with firms like O'Connor & Associates, Quantlab Financial, and Ritchie Capital Management; and has background in trading strategy research, risk analytics systems and operational development. He also has specific expertise in derivatives, highly automated trading systems, and numerous data management initiatives. Paul is a featured speaker at capital markets, data and technology events; regularly quoted in national, financial and industry media; and has provided live and recorded commentary for national and client media channels. Paul's most recent research and consulting focus has related primarily to areas like technology spending measurement and benchmarking, digital transformation, big data analytics, high performance computing (HPC) technologies, OTC derivatives reforms and quantitative trading methods. He earned a Master of Management from the J. L. Kellogg Graduate School of Management at Northwestern University and a B.S. in Business Administration from Valparaiso University. He was also awarded a patent related to data visualization and information design for trading and research systems in July 2009.
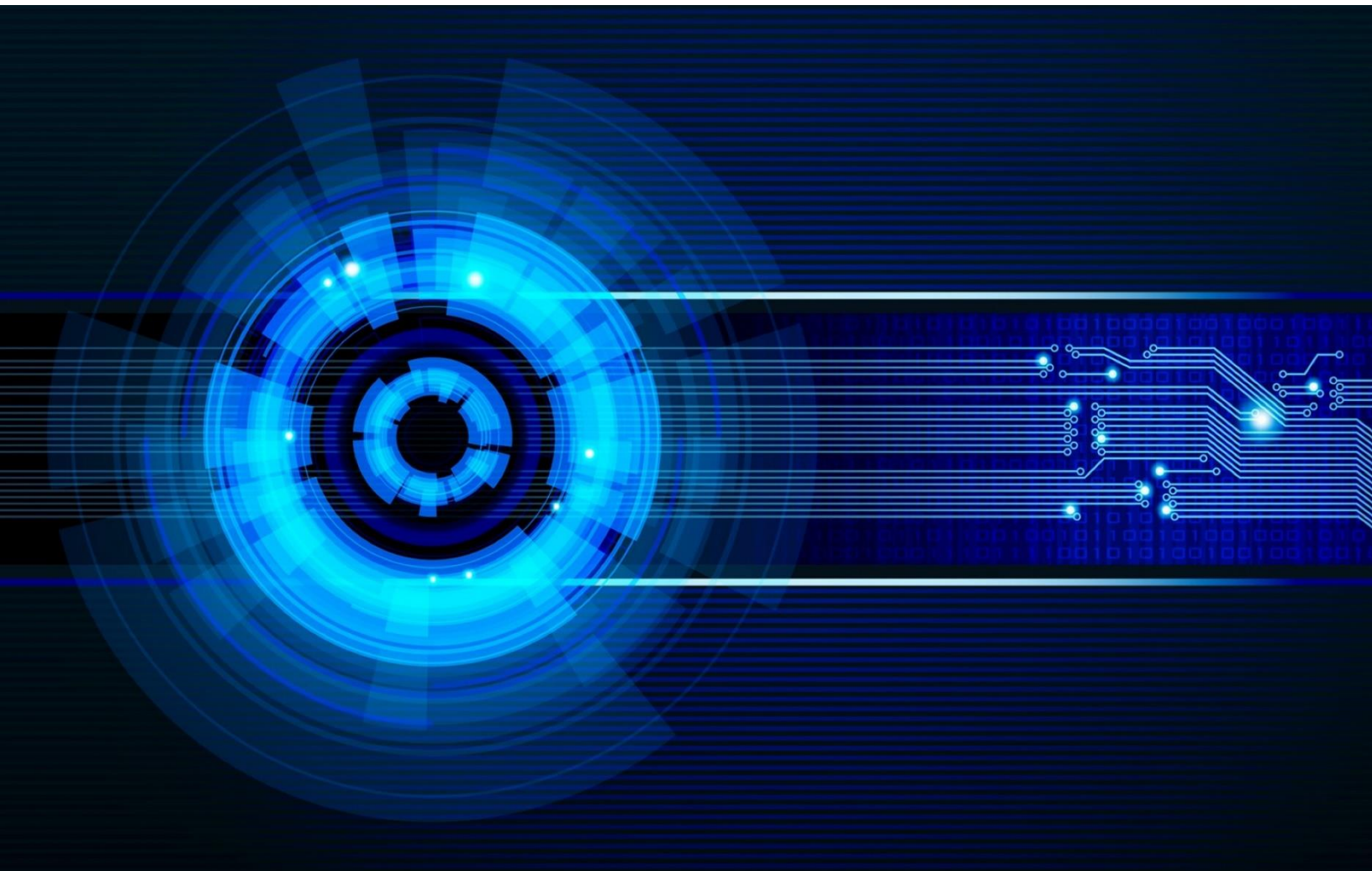
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