
Oregon Investment Council

August 13, 2014
9:00 AM

PERS Headquarters
11410 S.W. 68th Parkway
Tigard, OR 97223



Dick Solomon
Chair

John Skjervem
Chief Investment Officer

Ted Wheeler
State Treasurer

OREGON INVESTMENT COUNCIL

2014 Schedule

Meetings Begin at 9:00 am

PERS Headquarters Building
11410 S.W. 68th Parkway
Tigard, OR 97223

Wednesday, January 29, 2014

Wednesday, March 5, 2014

Wednesday, April 30, 2014

Wednesday, May 28, 2014

Wednesday, July 30, 2014

Wednesday, September 24, 2014

Wednesday, November 5, 2014

Wednesday, December 3, 2014



OREGON INVESTMENT COUNCIL

Agenda

August 13, 2014
9:00 AM

PERS Headquarters
11410 S.W. 68th Parkway
Tigard, OR 97223

<u>Time</u>	<u>A. Action Items</u>	<u>Presenter</u>	<u>Tab</u>
9:00-9:15	1. Investment Solutions Project and Recommendation	Darren Bond <i>Deputy State Treasurer</i> John Skjervem <i>Chief Investment Officer</i>	1
9:15-9:45	2. Investment Operations Current State <i>Strategic Risk Assessment Report</i>	Byron Williams <i>Chief Audit Executive</i> Michael Chung <i>Director, Deloitte & Touche LLP</i> Chris Morgan <i>Senior Manager, Deloitte & Touche LLP</i>	2
9:45-10:30	3. Investment Solutions Business Case	Byron Williams Anne Keys <i>Senior Consultant, Cutter Consulting</i> Shankar Subramanian <i>Principal, Cutter Consulting</i> Tom Nichols <i>Principal, Cutter Associates</i>	3
10:30-10:45	-----BREAK-----		
10:45-11:15	4. BlackRock Solutions	Larry Schwarz <i>Managing Director, Blackrock</i> Yevgeny Gelfand <i>Director, Blackrock</i>	4

11:15-11:30 5. Common School Fund
Public Equity Portfolio

Mike Mueller **5**
Deputy CIO
Jim Callahan
Callan Associates

6. Other Items

**Council
Staff
Consultants**

B. Public Comment Invited
15 Minutes

TAB 1 – INVESTMENT SOLUTIONS PROJECT
AND RECOMMENDATION

Investment Solutions Project

Purpose

Oregon State Treasury (OST) management recommends that the Oregon Investment Council (OIC) approve and execute a contract with BlackRock Solutions (BRS) to acquire an integrated suite of operating and risk management services. These services are necessary to rectify deficiencies within and throughout OST's current investment platform by providing staff with a set of contemporary tools and best practices in support of the State's \$90 billion investment portfolio.

Background

In 2011, and immediately following the OIC's mandated, regular investment program audit, OST began work on a comprehensive evaluation of its investment management capabilities. This effort included the observations and examinations of several leading industry consultants, and produced a detailed assessment of OST's current strengths and weaknesses in terms of personnel, technology, operating procedures and risk management. The assessment was further illuminated by a comparison to other public and private asset management organizations similar in size and scope to OST.

While the assessment resulted in high marks for OST in certain areas such as historical investment returns and staff quality, it also highlighted pronounced weaknesses in technology, operations and risk management. In fact, when one particular consultant evaluated OST solely as an asset manager (i.e., independent of its broader assignments and fiduciary responsibilities), these weaknesses were considered severe enough to warrant a "would not recommend" rating. Moreover, rapid recent growth in both the size and complexity of the State's investment portfolio now conspires with these operating and risk management deficiencies to put the sustainability of the State's vaunted long-term investment track record in jeopardy.

Fortunately, specific investments in technology combined with the adoption of new operating and risk management procedures can mitigate (and in many cases ameliorate) the weaknesses identified in the original audit and subsequent third-party consulting reports. These new tools and procedures are required immediately to fortify staff's current activities, and will also provide OST with a modern platform from which to successfully manage State funds in an increasingly complex and volatile investment environment.

Discussion/Investment Considerations

The OIC last conducted its mandated four-year investment program audit in 2011, the first such examination since the 2008-09 Global Financial Crisis. This audit exposed high levels of both unintended and unmanaged risks due to antiquated systems and technology infrastructure, obsolete and inadequate operating procedures and, relative to institutional peers, meager staffing levels. Today, these structural issues combine to produce an unacceptably high risk profile for the State's investment program, the most acute elements of which are categorized as follows:

Operational Risks

Separate and distinct from general market, security- or fund-specific investment risks, operational risks stem from the various components and linkages in the investment management process. These operational risks most often involve process or system failures as well as multiple forms of human error. The investment division's current operating model relies on antiquated systems and technology infrastructure which require excessive manual intervention by and among division staff.

Misallocated Resources

Current staffing, systems and process limitations regularly force the division's most senior investment officers into a variety of operational and administrative activities. In fact, the State's most experienced (and therefore most expensive) investment officers are routinely required to spend entire afternoons tracking down errant trade details, tasks that should instead be the domain of a dedicated "middle office" or operational team. Bottom line, OST's current operating platform precludes the efficient allocation of state resources.

Compliance Risks

Outdated processes and inadequate staffing also result in heightened compliance risks as the division currently lacks the necessary resources to effectively reduce, track and monitor these risks. As described directly above, investment staff often perform multiple functions that should instead be deliberately segregated for both cost and compliance purposes. This lack of functional separation deprives OST management the opportunity to identify and test process improvements as well as potentially obfuscates poor personnel performance. Functional separation is a basic, industry-standard safeguard, the absence of which puts both OST and State investment funds at unacceptably high levels of risk.

Attributes:

Integrated Service Offering. Most investment organizations are configured with the following process groups: a "front office" charged with portfolio management and trading; a "middle office" responsible for monitoring, tracking and reconciliation of all front office activity; and a "back office" that ensures all such activity is properly accounted for and accurately reflected in the organization's custodial records and reports. BRS is the only large-scale, institutional-quality vendor offering an integrated solution across front- and middle-office functions¹. This "straight-through" process integration will greatly diminish the investment division's operating risks and produce powerful efficiencies through "best practice" procedure adoption. For example, front office investment professionals will be liberated from middle office tasks enabling a better and more appropriate front office focus on portfolio management, trading and investment strategy. At the same time, compliance vulnerabilities will be significantly reduced as the BRS system forces separation of process execution and responsibility among front-, middle- and back-office functions.

Tested Platform. Reference calls confirmed that the BRS system is used by many organizations with asset management profiles similar to OST. Moreover, these calls revealed a uniformly high level of client satisfaction. Finally, BlackRock, the world's largest asset manager, uses the BRS system (specifically, the Aladdin operating and risk management platform) extensively throughout its own business and asset management activities.

¹ The evaluation, improvement and integration of OST's back-office functions will be considered later as Phase II of the Investment Solutions Project.

Conversion Optionality. The fully transparent and integrated nature of the Aladdin platform provides OST organizational optionality in the event legislation similar to HB 4144 is passed in the future. While the current contract OST is negotiating with BRS includes a significant outsourcing of middle-office and risk management positions, these positions can and may be insourced back to OST if budget and/or governance changes allow.

Concerns:

Technology and Process Changes. The systems and services contemplated in the BRS contract will introduce significant technology and operational process changes with commensurate training needs for OST staff. Moreover, the Aladdin platform's forced separation of specific operating functions and responsibilities is expected to have a cultural impact within the investment division. [Mitigant: Reference calls revealed consistently high levels of client satisfaction with respect to the BRS implementation team's training efforts and effectiveness, and OST management welcomes what it believes will be a positive cultural evolution that deliberately recognizes and resources each discreet element of the investment management process.]

Cost and Implementation Risks. Given the material size and scope of the systems and services contemplated in the BRS contract, cost overruns and implementation and/or activation delays are possible. Moreover, the contract itself represents the largest single vendor commitment OIC has thus far considered. [Mitigant: Reference calls revealed a consistent "on time, on budget" track record for the BRS implementation team. In fact, several calls indicated that the BRS implementation team's pace was at times too aggressive. In terms of cost, while individual components of the overall solution are available from multiple, alternative providers, OST management and its consultants believe that the provision of similar systems and services from these alternative providers would ultimately prove more expensive in terms of a) initial integration costs and b) higher on-going costs associated with maintaining and managing multiple vendor relationships.]

Legislative Reliance. While the systems and services contemplated in the BRS contract represent a largely outsourced solution, additional OST personnel will be required to ensure its timely implementation and daily functionality. Working closely with its consulting partners and BRS to identify, and specify, the minimum number of staff necessary to effectively implement and utilize the Aladdin platform, OST management has determined that additional permanent financing will be required from the Oregon State Legislature for five new OST positions (examples of which include a Director of Investment Operations, a Data Steward and a Chief Compliance Officer). Successful implementation of the Aladdin platform is not possible without immediate legislative support for these new staff positions; moreover, OST management is planning additional, subsequent position requests designed to exploit the entire breadth of the Aladdin platform's operating and risk management capabilities. [Mitigant: OST management believes that the investment division's current situation is untenable and failure to address its weaknesses in technology, operations and risk management increasingly imperils State investment funds. Should the Oregon State Legislature not approve sufficient permanent financing for the additional positions required to implement and utilize the Aladdin platform, staff will likely recommend "de-risking" the State's various investment portfolios.]

Terms

Contract terms have been aggressively negotiated and reflect OIC/OST's status as a strategic BlackRock partner.

Conclusion

The OIC and OST have arrived at an important cross-roads: following years of institutional success, the capabilities now required to adequately support and manage the State's global investment portfolio have far surpassed OST's current operating model. Moreover, the increasingly dramatic gap between OST's current operating model and what is required to meet an appropriate and sufficiently high fiduciary standard (i.e., "what is" vs. "what is required") manifests today as a series of operational and risk management deficiencies.

After three years of research and collaboration with leading industry consultants, OST has determined that contracting with BRS for a set of contemporary tools and operational best practices can accomplish the following, primary objectives: a) provide an effective remedy for the deficiencies identified in OST's current operating model; and b) introduce the technology and operating expertise necessary to support the increasing complexity of the State's various investment initiatives. Accordingly, OST management recommends the OIC approve and execute the BRS contract as well as support the legislatively requested OST staff additions.

TAB 2 – INVESTMENT OPERATIONS CURRENT STATE



Oregon State Treasury

Current State Strategic Risk Assessment

Date: July 31, 2014

This report is intended solely for the information and internal use of the Oregon Investment Council ("OIC") and the Oregon State Treasury ("OST"), and is not intended to be and should not be used by any person or entity. No other person or entity is entitled to rely, in any manner, or for any purpose, on this report and its findings.

Executive Summary

Background

We understand that the Oregon Investment Council (“OIC”) is responsible for overseeing and investing the assets and funds (hereinafter, the “State Investment Funds”) of the State of Oregon.¹ We further understand that the Investment Program of the Oregon State Treasury (“OST”) is responsible for the day-to-day administration, management and investment activities of the State Investment Funds, as well as implementing the governing policies and principles set forth by the OIC.

As the assets of the State Investment Funds have continued to grow and become more complex, OST has recently directed its attention to re-evaluating its current operating model and underlying processes and workflows. In connection with this initiative, OST has sought to analyze potential risks and inefficiencies that may accompany or limit the growth of the State Investment Funds and to strengthen the operational infrastructure (i.e., people, process and technology) in response to the increasing complexities. To this end, OST engaged Deloitte & Touche LLP (“Deloitte & Touche,” “we” or “us”) to conduct an assessment of the current operating model and infrastructure used to support the activities and objectives of the OST Investment Program.

Scope and Approach

Pursuant to the terms of the April 4, 2014 statement of work, we conducted a strategic risk assessment and gap analysis of certain front-office processes, as well as middle- and back-office operations and functions within OST’s Investment Program (the “Assessment”).² While there are investment and operational risks associated with managing an investment portfolio, and while these investment and operational risks are connected to and influence each other, the Assessment specifically focused on **operational** risks. That is, the risks arising from the business functions and resulting from breakdowns in the people, processes and technology (e.g., employee errors, business process disruptions and/or system failures). Investment risks, or those risks directly related to market conditions, investment strategy or investment policies, were not evaluated as part of this Assessment. To facilitate the Assessment, we segmented the operations and related processes and workflows associated with managing the State Investment Funds into 15 functional areas across the front-, middle- and back-office. We then evaluated the operational infrastructure elements implemented by OST to fulfill

¹ The State Investment Funds include the Oregon Public Employees Retirement Fund, the Oregon Short Term Fund, the Oregon Intermediate Term Pool, the State Accident Insurance Fund and a number of smaller funds. As of March 31, 2014, the market value of these funds totaled approximately \$90 billion.

² We understand that OST is exploring options with regard to which front-, middle- and/or back-office processes it may outsource as part of its future/target state considerations. In connection with defining its future state operating model, we further understand that OST has engaged a separate service provider to conduct a “fit assessment” to identify potential third-party vendors that may serve as an outsourced solution in the future state model.

its mission, achieve its strategic and investment objectives and mitigate the risks associated with its investment operations and activities. The Assessment comprised the following activities and analysis across the three operational infrastructure elements:

- **People:** Within each functional area, we met with those individuals responsible for managing, supervising or performing the various processes or control activities to gain an understanding of (i) the organizational structure and dynamics of the functional teams, (ii) the roles and responsibilities of the professionals within the Investment Program and the members of the OIC and (iii) the resources currently in place to support daily activities and operations.
- **Process:** We requested and read certain documents related to OST's governance structure and conducted process/control walk-throughs with those individuals responsible for performing the day-to-day operational activities related to the management of the State Investment Funds. The purpose was to analyze the business processes (including supporting documentation such as governance policies and procedures, compliance manuals and due diligence guidelines), approval mechanisms, reporting controls and ongoing monitoring procedures (i.e., the overall system of controls) associated with managing and overseeing the investment funds.
- **Technology:** We conducted a high-level analysis of the technology infrastructure (i.e., systems, applications and tools) currently in place to support and facilitate the operations and investment management activities of the Investment Program.

Summary of Recommendations

Based on the assessment and analysis of the aforementioned operational infrastructure elements across the in-scope functional areas, as well as our understanding of prudent industry practices, we identified a number of risks related to OST's investment operations and provided recommendations for management's consideration in the following five categories: Organizational Structure; Human Capital Management; Governance, Oversight and Compliance; Data Governance and Information Management; and Systems and Technology. Certain recommendations such as the development and implementation of a talent management strategy or automation of manual processes apply generally to the entire organization while other recommendations are more specific to a particular process, workflow and/or control procedure within a high-risk area.

The recommendations across the five categories are as follows:

1. Organizational Structure

The organizational structure is the foundation from which organizations operate to achieve their mission, strategic goals and, in the case of OST and other similar pension plans, their investment objectives. To strengthen its current organizational structure, we would recommend OST management consider the following measures:

- Establish an executive management-level position such as a Director/Head of Investment Operations (or equivalent) to oversee and manage the *operations* of the Investment Program. Responsibilities may include aligning and deploying resources to more effectively manage risks and generate process efficiencies, enhancing reporting and communication channels to provide information in a more timely and consistent basis and evaluating existing and/or new technologies to better support and facilitate operational workflows and processes.
- Establish a risk function, including a risk oversight committee, to assist with the development of risk management strategies, conduct risk analysis and assessments, develop and implement risk mitigation responses and provide risk management training.
- Establish a Chief Compliance Officer (“CCO”) role³ to oversee and administer the compliance policies, procedures and practices adopted by senior management. Illustrative responsibilities would include ensuring compliance with applicable laws, rules and regulations, periodically evaluating the efficacy of the compliance policies and procedures and managing the practical application of the compliance policies and procedures.

2. Human Capital Management

An organization’s human capital (i.e., its executive management, professionals and support staff) and the proper management thereof, is fundamental to that organization’s ability to function and operate in an effective manner. To manage the resources more effectively, we would recommend that management consider the following:

- Establish a formal talent management strategy that includes, among other things, (i) clearly defined skill-set requirements, roles and responsibilities and expectations for each of the positions created to support and facilitate the management of the State Investment Funds, (ii) a talent recruitment, retention and training program, (iii) processes to set goals and conduct periodic performance evaluations measured against those goals and (iv) career development and training initiatives;
- Provide more regular communications from the executive management team to demonstrate and re-iterate the “tone from the top,” foster OST’s culture of compliance and demonstrate management’s commitment to supporting the employees throughout their career; and
- Develop a formal succession and contingency plan to manage mission critical positions essential to the achievement of OST’s strategic and investment objectives.

³ While the recommendation to establish a CCO position is specific to the Compliance function within the Investment Program for purposes of this report, the CCO would likely be an OST-level position with broader oversight and compliance responsibilities.

3. Governance, Oversight and Compliance

Collectively, governance, oversight and compliance is the system of controls an organization has in place to measure, monitor and manage risks specific to its business model and operations. In light of OST's investment activities and investment management responsibilities, we would recommend that, in addition to creating a CCO role as noted above, management consider establishing, among other things, the following:

- Governance and/or oversight bodies such as (i) an executive committee to implement an organization's guiding principles, policies and standards, (ii) a risk committee to oversee the development and implementation of risk management strategies, (iii) a data governance committee to oversee the management, maintenance, control and treatment of the data and information and (iv) a policy committee (or equivalent) to oversee the implementation, maintenance, revisions and related training;
- Management reports and performance standards to monitor and assess the efficacy of operational and compliance control activities (including functions delegated to outside vendors/parties);
- Formal processes, including reporting tools, to track, escalate and resolve compliance issues and exceptions; and
- Back-testing procedures to assess compliance with statutes, regulations and internal policies, as well as to identify trends and patterns that may suggest potential control weaknesses or gaps.

4. Data Governance and Information Management

Data governance is the collection of policies, procedures, systems and controls through which an organization such as OST maintains and manages data and information in connection with its operations and investment activities. Given the importance complete, accurate and timely data and information play with regard to OST's investment activities, we would suggest that management consider undertaking the following actions:

- Establish, as previously noted, a data governance committee to oversee and manage the data and information throughout OST and the Investment Program;
- Analyze and inventory the internal and external sources of data required to manage and invest all State Investment Funds, and, to the extent feasible or practicable, consolidate and streamline the data vendors, domains and repositories into a single source;
- Designate and assign "data owners" to manage and administer the availability, integrity and security of the data and information used in connection with managing and investing the State Investment Funds;
- Enhance and develop as necessary, procedures and controls to prevent the misuse, loss or alteration of data and information necessary for the management and investment of the State Investment Funds;

- Designate a data steward to be responsible for, among other things, managing the data and information pursuant to the data governance policies and standards;
- Develop a data dictionary/model, including a mapping of the data elements required to run the various systems, applications and tools used to make investment decisions, analyze investment as well as operational risks, calculate performance results, reconcile accounts and maintain all books and records; and
- Adopt a standard records and document management policy to facilitate the maintenance, retention, classification, centralization and destruction of data, information, records and documents.

5. Systems and Technology

An organization's technology infrastructure, including its systems, applications and tools, provides it with the ability to, among other things, store, analyze and report on enterprise-wide data, integrate processes across functions and streamline and simplify complex processes. To minimize risks associated with system failures and address risks resulting from inconsistent or manual processes, we would suggest that management consider the following:

- Reduce its dependence on spreadsheets and other manual processes to make investment decisions, analyze portfolio and operational risks, monitor compliance with investment guidelines and prepare and produce management/exception reports;
- Integrate internal and external systems, technology platforms and data sources to reduce costs and errors and increase operational and process efficiencies; and
- Enhance operational reporting capabilities to facilitate the monitoring and identification of potential sources/causes of compliance breaches, processing errors, operational issues and control weaknesses.

Should OST decide to undertake some or all of the recommendations, OST may need to create new positions, hire additional resources, re-align and redeploy resources, redesign operational workflows and processes and/or implement new systems. While there will likely be short-term cost increases associated with these organizational and operational changes, OST should be able to realize longer-term cost savings through increased automation, risk reduction and operational efficiencies. OST may also realize long-term cost savings by pursuing outsourced solutions.

* * * * *

Professional Standards

Our services were performed in accordance with the Statement on Standards for Consulting Services that is issued by the American Institute of Certified Public Accountants (“AICPA”). We provided to the Oregon Investment Council (“OIC”) our observations, advice and recommendations. However, our services did not constitute an engagement to provide audit, compilation, review or attestation services as described in the pronouncements on professional standards issued by the AICPA, and, therefore, we did not express an opinion or other form of assurance with respect to our services.

In addition, we did not provide any legal advice regarding our services nor did we provide any assurance regarding the outcome of any future audit or regulatory examination or other regulatory action. The responsibility for all legal issues with respect to these matters, such as reviewing all deliverables and work product for any legal implications to OIC, is OIC’s. It is further understood that OIC has responsibility for, among other things, identifying and ensuring compliance with laws and regulations applicable to OST’s activities and for establishing and maintaining effective internal control to assure such compliance. OIC will have responsibility for reviewing and approving any reports and/or deliverables.

Deloitte & Touche’s services may include advice and recommendations, but all decisions in connection with the implementation of such advice and recommendations is the responsibility of, and made by, OIC. In connection with its providing the services described herein, Deloitte & Touche relied on all decisions and approvals of OIC.

The information set forth herein is not to be circulated, quoted, disclosed or distributed, nor shall reference to our findings, deliverables or Deloitte & Touche be made to any person or entity, without written permission from Deloitte & Touche. No other person or entity is entitled to rely, in any manner, or for any purpose, on our findings.

TAB 3 – INVESTMENT SOLUTIONS BUSINESS CASE



Oregon State Treasury

Presentation for the Oregon Investment Council

August 13, 2014

Investment Solutions Business Case

Cutter Associates

- Executive Summary
- Current State
 - Need for Improvement
 - Peer Comparisons
- Target State
 - Goals
 - Solutions & Recommendation
 - Benefits
- Implementation
 - Approach
 - Schedule
- Costs
- Additional Initiatives/Considerations
- Why It Is Vital to Make this Investment Now
- Appendix

- Among public pension funds sector, the OIC is admired for its sophisticated investment function, portfolio diversification and superior long-term investment performance.
- Admirably, this track record has been achieved with an investment platform and operational infrastructure that lags significantly behind its peers.
- Over the past three years, the gap has grown, even as Treasury has conducted assessments, identified options to improve the operational infrastructure, and unsuccessfully pursued legislative options to address issues.
- In order to protect its position as a market leader and fulfill its fiduciary obligation, OIC needs to address operational risks arising from:
 - proprietary manual processes;
 - unreliable data quality;
 - low staffing levels;
 - inadequate tools to support portfolio management.
- A significant investment of time and money is required to address these issues and the issues will continue to increase if resolution is deferred.

- This document recommends a multi-year business transformation program to implement the market-leading BlackRock Solutions (BRS) services and tools for investment processing.
- The OIC will need to request Treasury to adequately staff for this transformational change. Minimum staffing levels to support BRS have been identified, but the proposed staffing is insufficient to address many of the deficiencies identified.
- By making this investment, OIC will:
 - have the organization, tools, processes and data to maintain its leadership position in the public investment fund industry;
 - fulfill its fiduciary obligation of prudent risk management; and
 - resolve certain key operational issues.

Key Deficiencies

- Lack of systems support for the automation of end-to-end workflows
- Weaknesses in investment compliance (pre and post-trade)
- Inadequate analytics and data for investment decision support
- Lack of viable Risk Management Program

Results in

- Acute fundamental weakness in key areas of investment management
- Significantly behind peer group in a number of investment functions
- Key person risks in several areas
- Inadequate controls, governance and oversight

Business Impact

- Inhibits business agility, growth and adoption of new strategies
- Exposes OST to monetary losses and reputational risks
- Ineffective use of resources & challenges in retaining / attracting qualified staff

A Few Illustrations of the Issues at OST

Issue

Impact

Poor
Automation of
investment
compliance

OST does not have modern tools to ensure that its sub-advisors and portfolio managers are complying with the firm's investment policies. This exposes OST to potential economic losses and reputation risk.

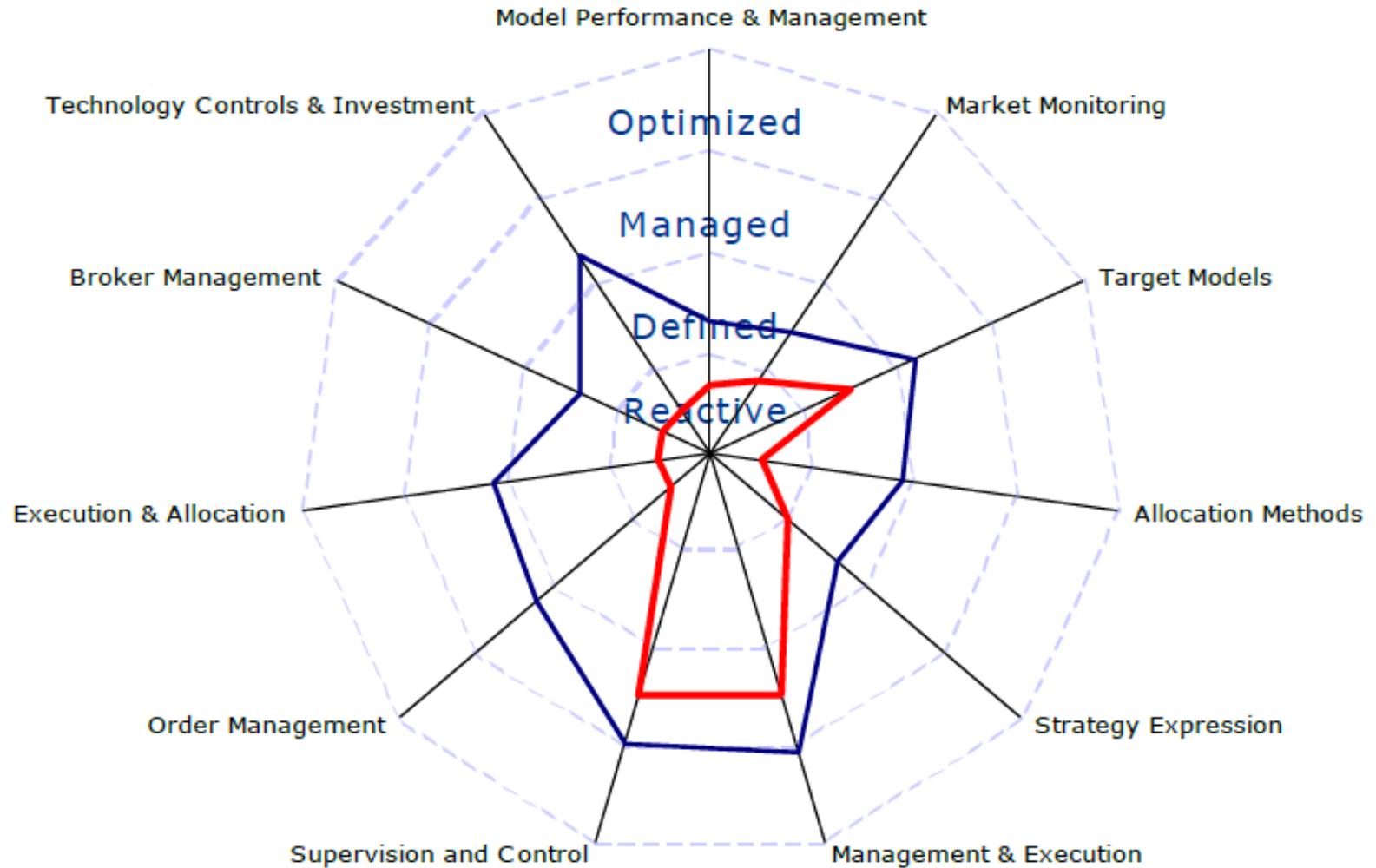
Lack of front-
and middle-
office
automation

Highly skilled portfolio managers are spending several (2+) hours a day on manual tasks rather than focusing on making investment decisions benefitting OST's customers.

Lack of
Scalability

Portfolio management using manually maintained Excel cannot support increased volumes or complexity.

Fixed Income Portfolio Management



Oregon Investment Staffing Is Significantly Below Its Peers

Staffing : Treasury Current State to Peers : Average FTE's by Functional Area

Functional Area	Public Sector Firms		OST \$88B	Private Sector Firms	
	Medium 30B-100B	Large > 100 B		Medium 30B-100B	Large > 100 B
Investments: Research, Portfolio Management & Trading	30	69	19	116	208
Investment Risk Management	3	10	0	6	36
Accounting and Operations	36	43	6	120	216
Business Analysts	4	11	0	12	63
Information Services	23	63	3	22	581
Total	96	196	28	275	1104

Address current areas of acute, fundamental weakness in investment management, including risk management and investment operations

Mitigate investment, operational risks and unintended consequences that may lead to reputational damage and / or monetary losses due to investment processing errors

Enable transformational change to elevate Treasury's investment operations to a level closer to peer organizations

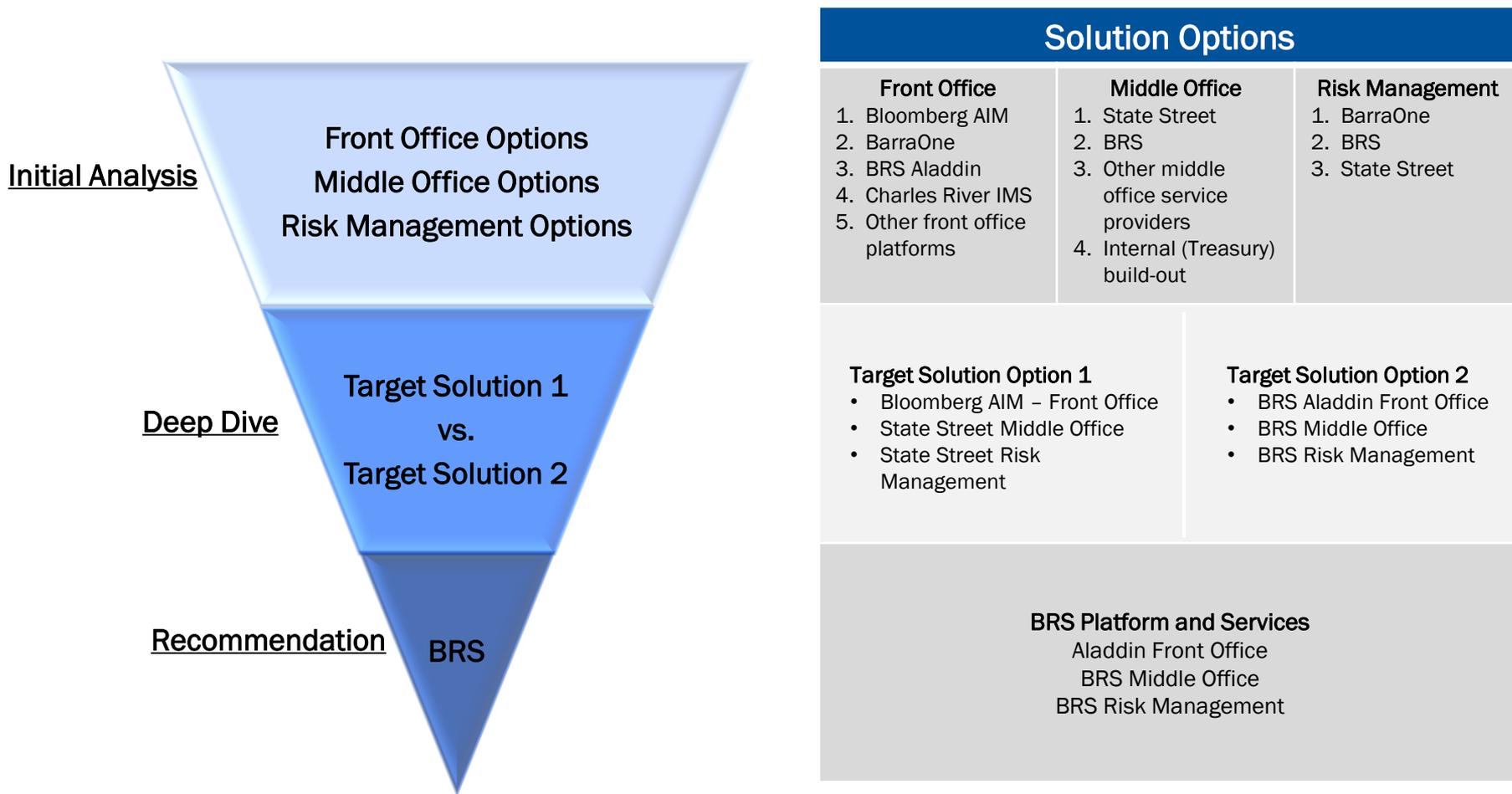
Provide greater transparency and timeliness of information for the OIC to fulfill fiduciary responsibilities and to assist Treasury staff in making appropriate investment decisions

Build an investment processing model that is based on preferred industry practices, with sufficient downstream flexibility in order to address potential changes in strategic direction

- Change the mix and structure of assets invested, in response to changes in the market and investment landscape
- Reducing investment expenses by increasing the internal management of portfolios
- Allow for a smooth transition to an insourced or hybrid model of investment processing in the future, if deemed desirable

Recommended Vendor – Black Rock Solutions

Over the past 2 years, Treasury, with assistance from Cutter, has analyzed and determined that BlackRock Solutions’ (BRS) integrated offering is the best solution option for front office, middle office and risk management functions.



Initial analysis for investment accounting was done; deep dive is needed.

Why BRS Aladdin is the Best Solution for Treasury

- **Best of breed fixed income portfolio management platform that is widely adopted by Treasury's public fund peers**
- **Provides Treasury with access to industry expertise while minimizing staff increases**
- **Addresses Treasury' operational risk by providing automated, integrated front and middle office platform and services**
- **Robust compliance capability ensures Treasury investment activities are made within OIC compliance rules**
- **Strategic partnership with BRS will drive Treasury to adopt industry standard processes and keep pace with future trends**
- **Standardization will enable Treasury to adapt more easily to future changes in operating models**
- **Proven implementation approach will ensure business benefits will be achieved within one year**

BLACKROCK
SOLUTIONS®



A Few Specific Examples of How Aladdin Can Help

Issue

Poor
Automation of
Investment
Compliance

Impact

OST does not have modern tools to ensure that its sub-advisors and portfolio managers are complying with the firm's investment policies. This exposes OST to potential economic losses and reputation risk.

Aladdin Result

All investment compliance violations will be flagged & dealt with immediately before they become an issue.

Lack of Front-
and Middle-
Office
Automation

Highly skilled portfolio managers are spending several (2+) hours a day on manual tasks rather than focusing on making investment decisions.

Portfolio managers are freed up to focus on what they do best: generate investment returns.

Lack of
Scalability

Portfolio management using manually maintained Excel cannot support increased volumes or additional complexity.

Robust portfolio management tools capable of supporting large volumes and complex assets / products.

Business Transformation Benefits

Addressing areas of weakness

- Significantly reduces manual processes & improves data for Front Office by increased automation
- Adopts standard tools, workflow and processes: integrated front and middle office tool used throughout the investment process

Ability to support potential changes in strategic direction

- Increases scalability for taking on additional investments
- Robust front office platform & outsourced trade confirmation / settlement processes
- Reduces Front Office time spent on operational activities

Mitigate risks and unintended consequences

- Reduces key person risk: establishment of Inv. Operations team provides additional segregation of duties
- Improves data quality: daily reconciliations improves accuracy and timeliness of Start of Day positions and cash

Elevate OST's Investment Operations to a level equivalent with peers

- BRS Solution considered "best of breed" within the industry
- Strategic partnership with BRS, Investment Management expertise & industry leader

Greater transparency and timeliness of data for the OIC and OST staff

- Consistent and timely monitoring of external managers
- Enhanced oversight and governance capabilities
- More robust reporting: dashboards and enhanced risk management

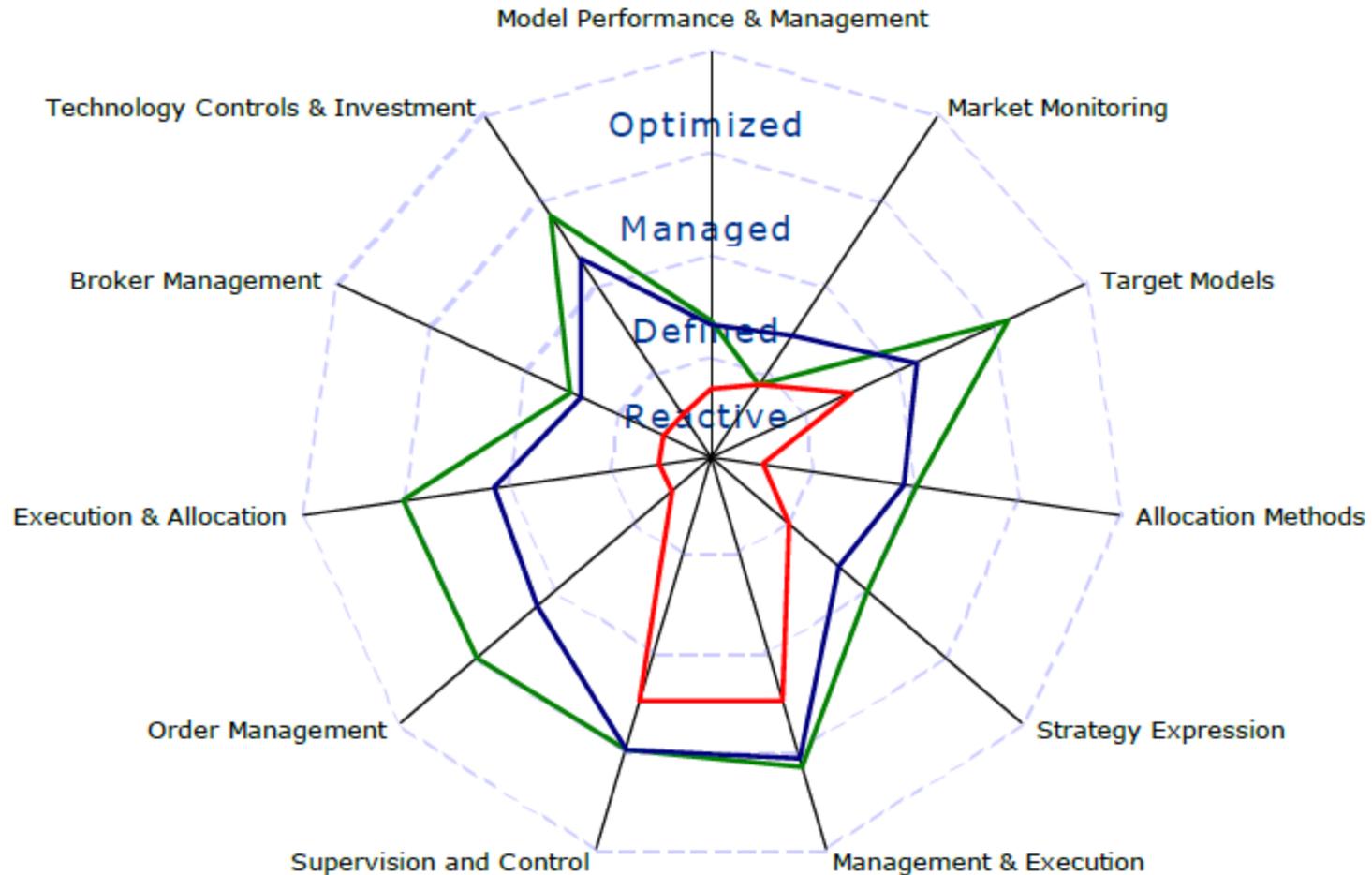
Target State Improvements

Requirement		Scores*	
		Current	Target
General	Scalable and flexible platform for investment processing	2.5	4.6
	Ability to take on additional internally managed assets, with a focus on fixed income	2.5	4.8
	Mitigate operational risks and errors in investment processing	2.0	4.0
	Enable clear separation of duties and controls in investment process	1.5	4.5
	Provide improved access to data for operational and management reporting	2.5	3.6
	Engage with strategic partner who will enable preferred industry practices	2.0	4.3
Front Office	Provide investment officers with timely, accurate data required for investment decisions	2.0	4.3
	Enable increased automation in Portfolio Management process - Equity	2.0	3.5
	Enable increased automation in Portfolio Management process - Fixed Income	2.5	4.5
	Improve auditability and tracking of portfolio construction and trading processes	2.5	4.0
	Provide seamless integration with electronic trading platforms	3.0	4.5
Middle Office	Enable investment officers to focus on investment decisions instead of operational tasks	2.0	4.1
	Enable improved investment compliance	1.5	4.0
	Reduce internal manual processes in investment operational functions	2.5	3.8
	Support accurate and timely reporting of performance and attribution	3.0	4.0
Risk Mgt.	Enable measurement and monitoring of portfolio and plan level investment risks	1.0	5.0
	Enable Treasury to interpret and explain investment risks to the Board	1.0	5.0

***Ratings on a scale of 1 to 5**

- 5. Best of Breed Solution
- 4. Enables best practices
- 3. Meets minimum requirements
- 2. Falls short of requirements
- 1. Not available or unacceptable

Fixed Income Portfolio Management



The implementation of Aladdin is an “on boarding” process that can be accomplished much more quickly and at a lower risk

BRS deploys a proven implementation methodology with an excellent track record

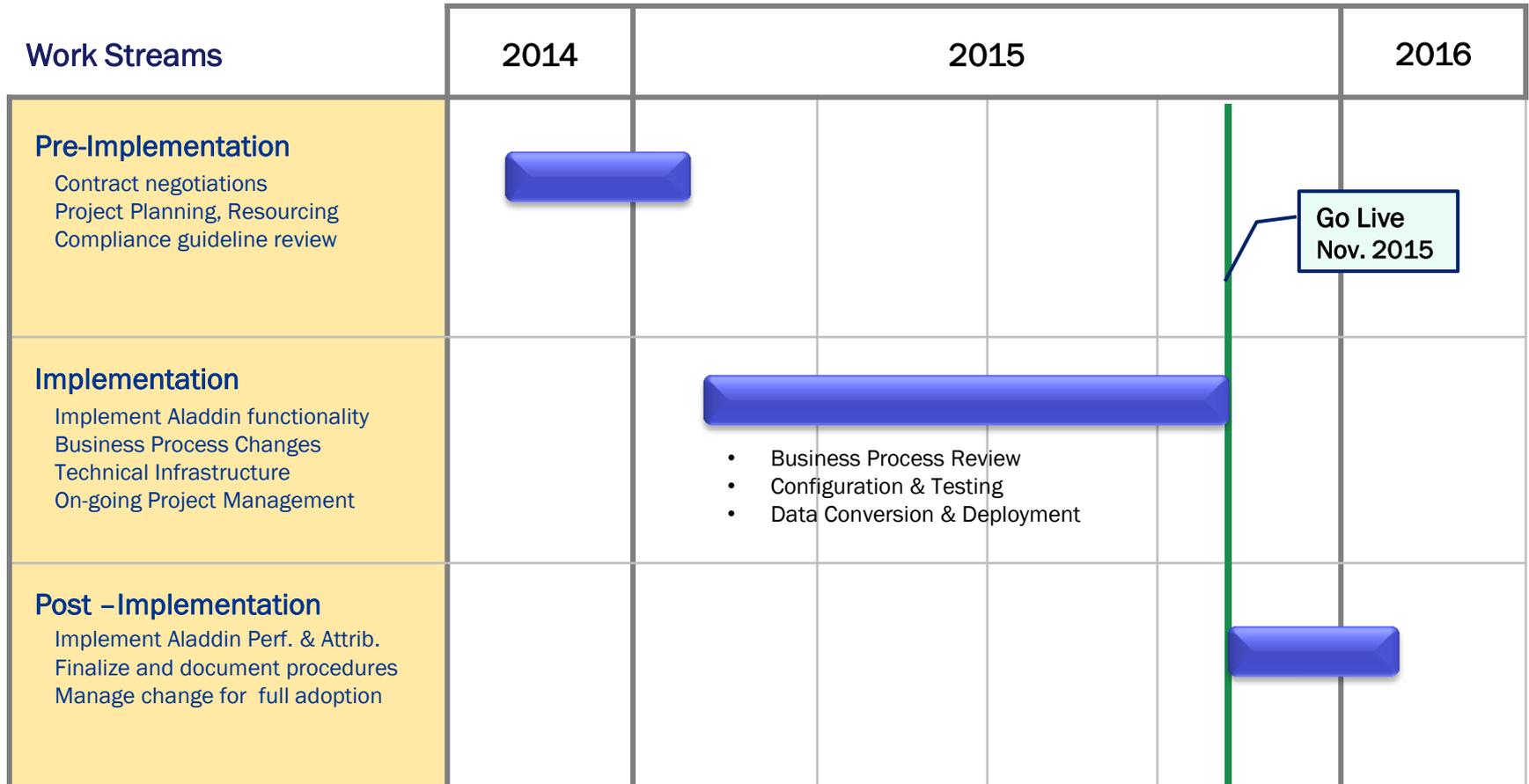
- Utilizes experienced BRS project manager and subject matter experts (SME's)
- Business Process Reviews (BPR): reengineering of current Treasury business process into “best practices” process while tuning to specifics of Treasury workflows and constraints
- Extensive Aladdin compliance rule library provides base for Treasury rule building
- Installed on BRS's robust infrastructure - minimizes Treasury technology build out
- Focus on knowledge transfer and training

Treasury will supplement its internal staff by engaging external SME's with experience implementing Aladdin

Transformational Change Can be Achieved in 15 Months

Major Activities

- Implement BRS front, middle office and risk solutions and services
- Implement business process changes to transition to the target operating model and desired service levels
- New staff on-boarding and training on new environment and solutions



Potential Phase II Initiatives

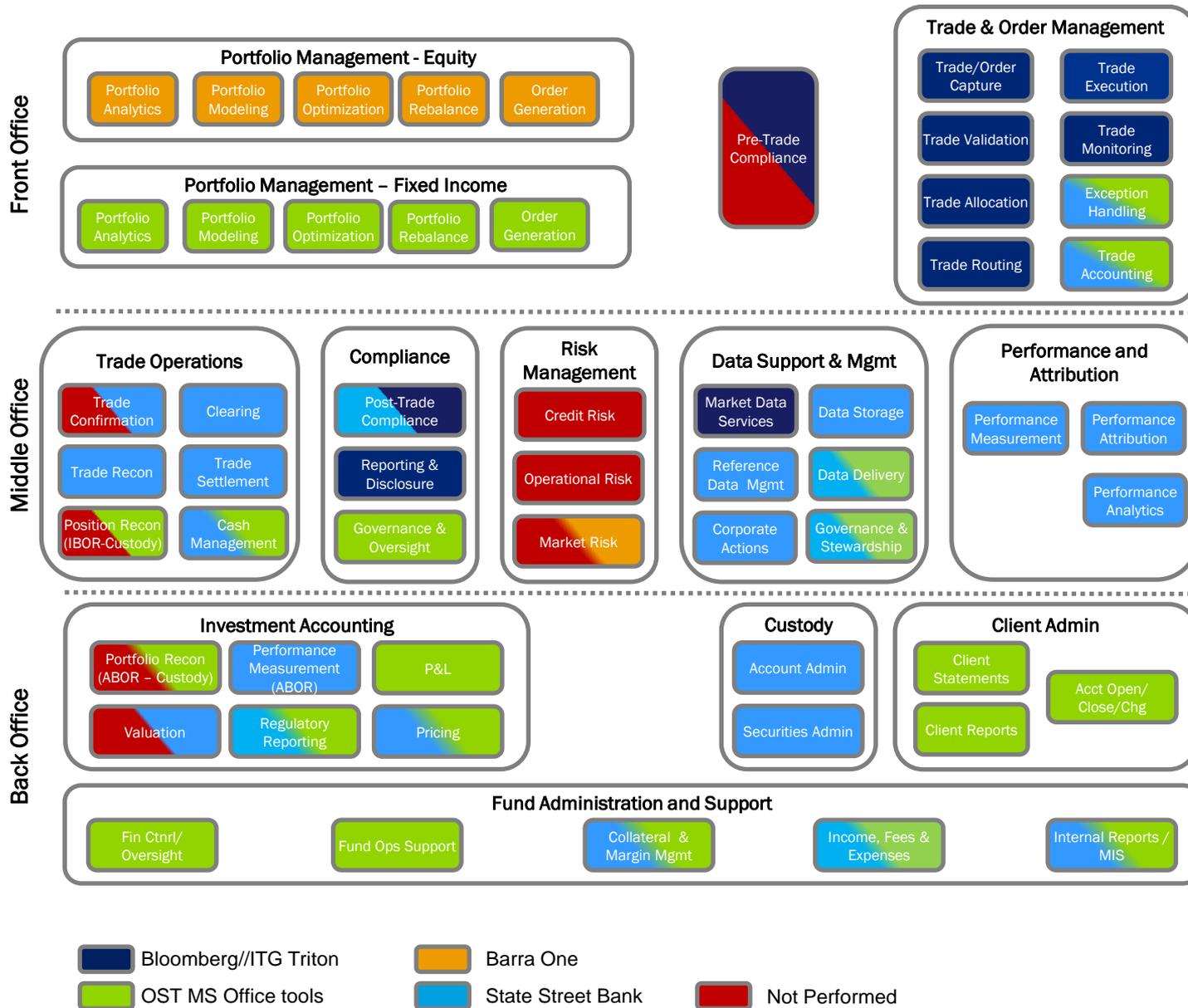
- 1) Investment Accounting
- 2) Private Markets Processing (middle and back office)

Why Is It Vital to Make This Investment Now?

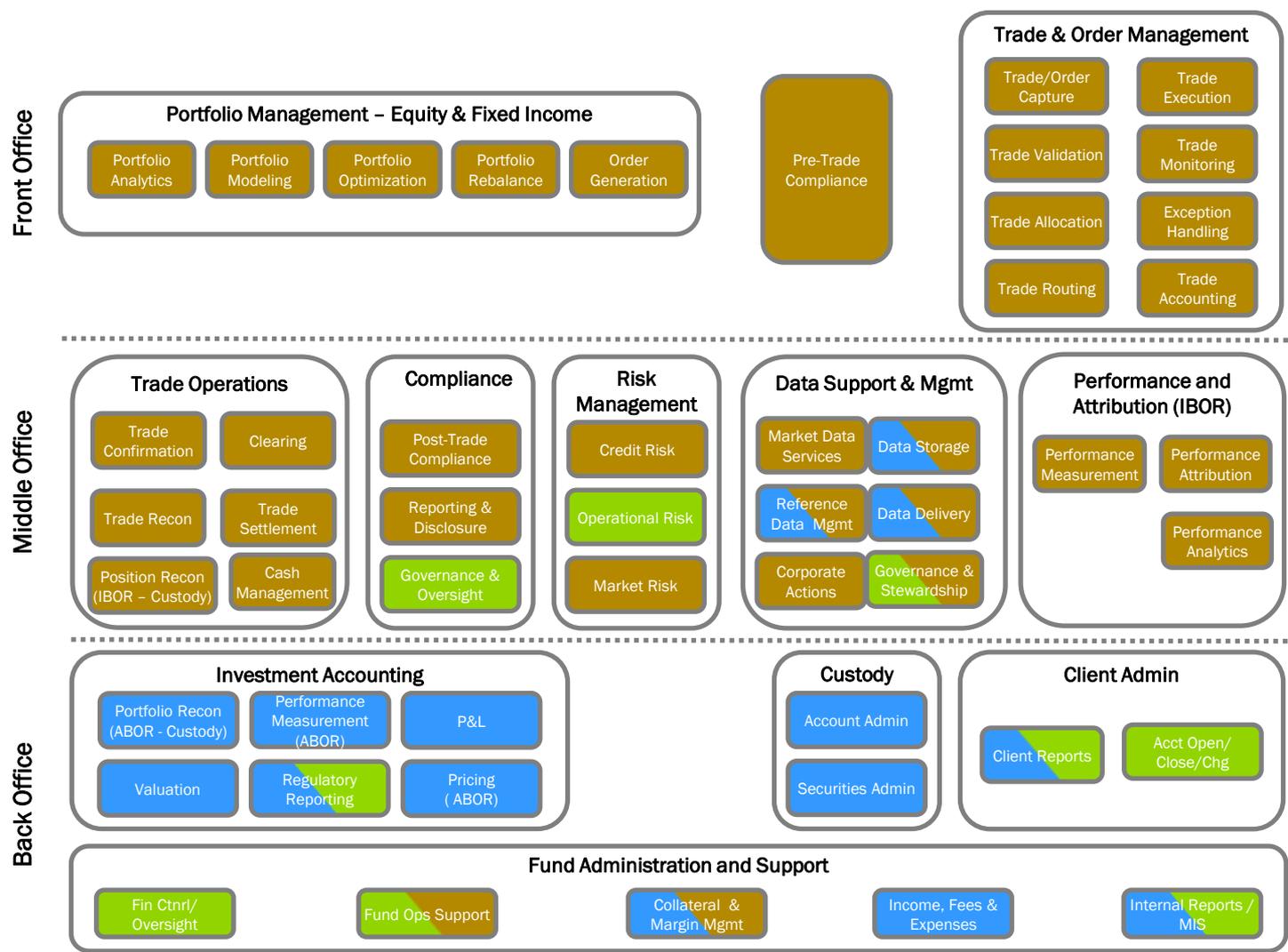
- **Enable OIC to maintain its industry leadership**
 - Respond quickly to market changes or enter into new types of investments
 - Deploy Front Office tools for more robust portfolio management
 - Provide timely and accurate data for investment decision-making
 - Enable enhanced oversight on external managers and active engagement with investment consultants
- **Reduce the potential for monetary losses or reputational damage due to:**
 - Investment processing errors
 - Compliance violations
 - Insufficient investment risk management
- **More effective utilization of scarce resources:**
 - Operations staff to ensure Investment officers are not distracted by operational activities
 - Elimination of some key person risk – potential for significant disruptions with staffing attrition / changes
 - Establish segregation of duties with clearly defined roles and responsibilities

- Functional Coverage: Current and Target Operating Model
- Implementation Schedule
- Implementation Resource Requirements
- BRS Implementation Services
- Project Risks
- Preferred Operating Model Options – Phase II

Current State



Target Operating Model: BRS Front & Middle Office



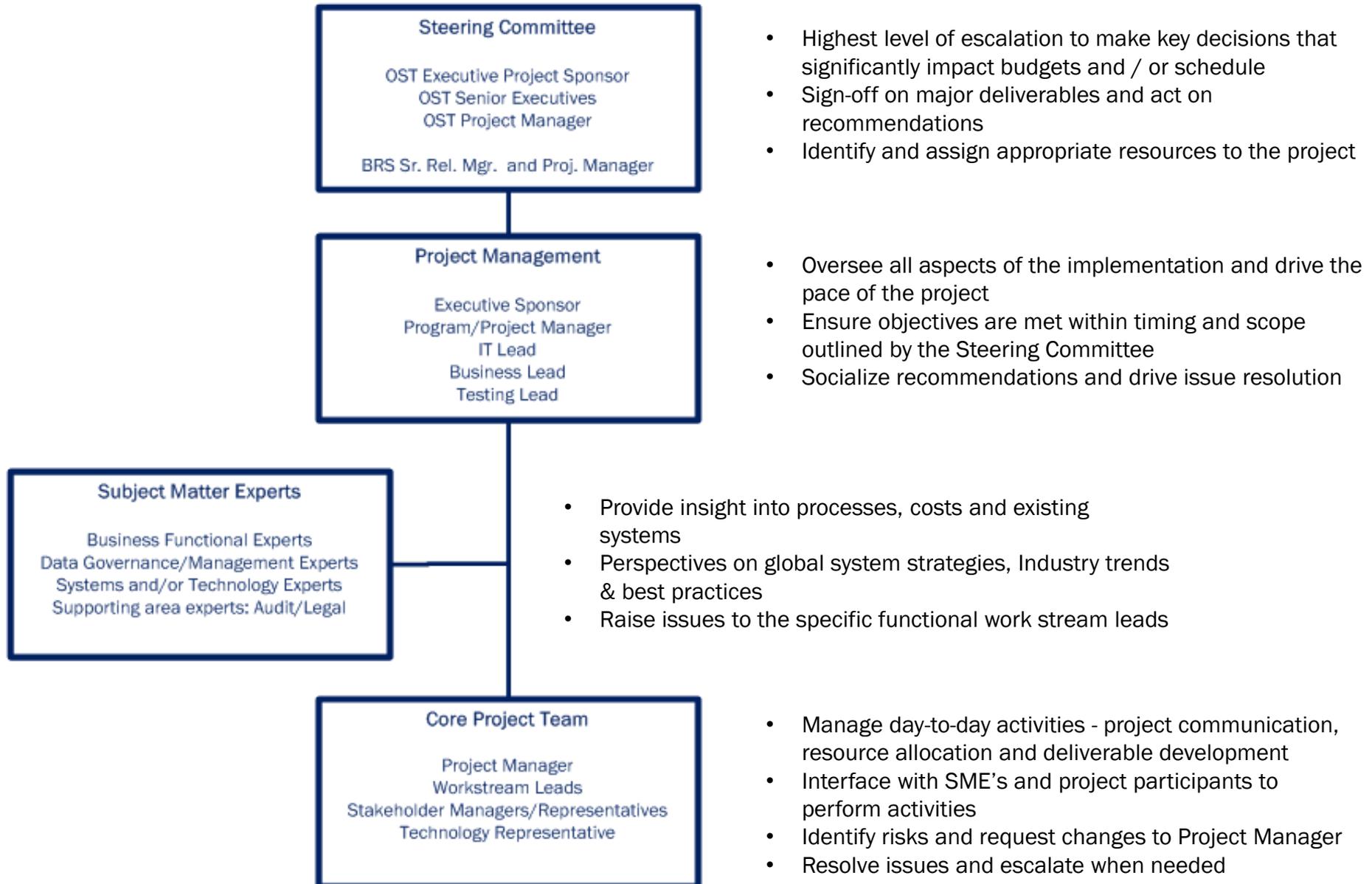
- BRS Aladdin + Middle Office
- State Street Bank - Existing
- OST
- State Street – ABOR; BRS - IBOR

Phase I: will use current SSB services for Investment Accounting

Implementation Schedule

Stage			Pre-Implementation		Implementation										Post Go-Live		
Work Stream	Activity / Role	Type	Q1		Q2			Q3			Q4			Q5			
			2014		2015												
			Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
Phase I - Aladdin and Middle Office Outsourcing																	
Program Management	Detailed planning, resource onboarding																
	Change Management																
	Test Management / QA																
	Ongoing project management																
Vendor Management	BRS Contracting																
	Market Data Contracts																
	State Street Contract revisions																
Technical Architecture	IT Infrastructure																
Middle Office Services	BPR / Design																
	MO Config & Testing																
	Third party interfaces																
	Data Conversion & Parallel																
Front Office	BPR / Design																
	Config & Testing																
	MO Integration & Parallel																
	Performance & Attribution full rollout																
	Decomissioning Applications																
Compliance	Guideline Review																
	Rules Creation																
	Workflow, Testing																
	MO Integration & Parallel																
Risk Management	Requirements / Planning																
	Design / BPR																
	Config / Testing																
	Reporting																

Implementation Project Organization & Governance



Implementation Resource Requirements

Resource	Role
Program/Project Manager	<ul style="list-style-type: none"> Ensures project stays on schedule and budget while delivering all required functionality Co-ordinates activities in all work-streams; proactively works with BRS, Investment Officers, Compliance and other staff to ensure right solution is delivered
Change Management BA	<ul style="list-style-type: none"> Communicates and manages the changes within Treasury to ensure complete adoption and process improvements expected
Testing and Quality Assurance Analyst	<ul style="list-style-type: none"> Establishment of Treasury's testing process and acceptance criteria Assist Treasury staff with test planning, script creation and test execution
Vendor Management SME	<ul style="list-style-type: none"> Manages all the vendor/service provider contracts and SLA's. Ensures optimized robust contracts are negotiated, including Service Level Agreements.
IT Infrastructure	<ul style="list-style-type: none"> Establishes the technical environment needed for connectivity to BRS, transmission of files between all parties and use of Aladdin by Treasury staff
Data Integrator	<ul style="list-style-type: none"> Manages all of the Interface work required for the project to ensure complete and timely data transfer to and from Aladdin
Investment Operations Manager & Specialists	<ul style="list-style-type: none"> Ensures that all of Treasury middle office requirements are met and processes are documented Treasury's data SME responsible for all the data analysis and verification throughout the project
Compliance Mgr. & Analyst	<ul style="list-style-type: none"> Ensures Treasury's compliance rules are correctly translated, configured, assigned and tested
Perf., Attr. Risk & Analytics Business Analyst	<ul style="list-style-type: none"> Working with the Front Office SME's design Treasury's Green Package(GP) Ensures Treasury's Performance and Attribution requirements are met
Investment Officers & Front Office Specialist	<ul style="list-style-type: none"> Provides coordination and support for the Front Office work stream to help ensure Aladdin meets all of the Front Office needs. Key business contact for Treasury Front Office activities – BPR, Aladdin configuration, general communication, testing and training
Investment Risk Officer	<ul style="list-style-type: none"> Establish a robust risk program for Treasury's risk monitoring and reporting Enables implementation of Aladdin's risk tools and dashboards

Implementation Resource Requirements

Leverages BRS Implementation services – system and process expertise

Stage			Pre-Implementation		Implementation										Post Go-Live			
Work Stream	Activity / Role	Type	Q1		Q2			Q3			Q4			Q5			Total (Person Mths)	
			2014		2015													
			Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		Jan
Phase I - Aladdin and Middle Office Outsourcing																		
Program Management	Program / Project Manager	S	0.2	0.2	0.2	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5			5.60
Program Management	Program / Project Manager	C	0.5	0.5	0.5	1	1	1	1	1	1	1	1	1				10.50
Program Management	Change Management BA	S	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2		2.80
Program Management	Test Management / QA	C			0.5	1	1						0.5	1				4.00
Vendor Management	Vendor Management SME	S	0.2	0.5	0.5	0.5	0.2	0.2					0.2	0.2				2.50
Technical Architecture	IT Infrastructure	S			0.5	0.2	0.2						0.2	0.2				1.30
Interface Management	Data Integrator	S							1	1	1	1	1	1				6.00
Middle Office	Investment Operations Specialist	C				1	1	1	1	1	1	1	1	1				9.00
Middle Office	Investment Ops - Manager	S	0.2	0.2	0.2	0.2	0.5	0.5	0.5	0.2	0.2	0.5	0.5	0.5	0.5			4.70
Middle Office	Investment Data Specialist	C				1	1	1	1	1	1	1	1	1				9.00
Middle Office	Cash Management	S				0.2	0.5	0.5	0.5	0.2	0.2	0.5	0.5	0.5				3.60
Compliance	Compliance Manager	S		0.2	0.2	0.2	0.5	0.5	0.2	0.2	0.2	0.2	0.2	0.2				2.80
Compliance	Compliance Analyst	S				0.2	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5				4.20
Front Office	Perf., Attr. Risk & Analytics BA	S				0.5	0.5	0.5	0.5	0.2	0.2	0.5	0.5	0.5	0.5	0.5	0.5	5.40
Front Office	Front Office Specialist (FI & Equity)	C				1	1	1	1	1	1	1	1	1	1	0.5		10.50
Front Office	Investment Officer - Equity	S				0.2	0.5	0.5	0.5	0.2	0.2	0.5	0.5	0.5				3.60
Front Office	Investment Officer - Fixed Income	S				0.2	0.5	0.5	0.5	0.2	0.2	0.5	0.5	0.5				3.60
Risk Management	Investment Risk Specialist	S				0.2	0.5	0.5	0.5	0.2	0.2	0.5	0.5	0.5				3.60
Phase I Total			1.3	1.8	2.8	8.3	10.1	8.9	9.4	7.6	7.6	9.4	10.3	10.8	2.7	1.2	0.5	92.70

Resource Type:

C = External Consultant

S = Treasury Staff

Implementation services

The key to a successful project starts with the implementation

Technical Infrastructure	<ul style="list-style-type: none">• BRS installs and configures the technical infrastructure required to operate Aladdin• This includes incorporating clients into BRS' Disaster Recovery plan
Data Conversion	<ul style="list-style-type: none">• BRS pre-loads portfolios in order to assess the accuracy and completeness of its security master
Project Management	<ul style="list-style-type: none">• BRS co-manage implementations with clients
Initial Risk Management Reports	<ul style="list-style-type: none">• Begin to run client's outstanding holdings through BRS' models• Beta risk management reports are distributed to clients as part of the initial quality control process
Interfaces	<ul style="list-style-type: none">• BRS works with each client's technology staff to map data from Aladdin's interface files into client accounting systems
Compliance Set-Up	<ul style="list-style-type: none">• BRS' compliance team maps client investment guidelines to Aladdin's extensive compliance rule library
Business Process Review	<ul style="list-style-type: none">• BRS works with clients to reengineer their current business process into a "best practices" process that maximizes the functionality of Aladdin
Customized Website and Reporting Suite	<ul style="list-style-type: none">• BRS works with clients to create the layout and content of their websites• Portfolio reports are customized to best meet client requirements
Training	<ul style="list-style-type: none">• BRS provides one-on-one and classroom training sessions

Project Risks

Risk	Mitigation Steps
Aladdin may be implemented in a manner that does not address the processes specific to Treasury	As one of the first steps in the implementation, conduct a business process review (BPR) to ensure that the offering lines up with the desired workflows at Treasury
Treasury may not have the staffing necessary for a successful implementation	Create an implementation staffing plan that uses realistic assessment of when new resources can be on-boarded. Utilize qualified consultants as needed
The BRS solution may place excessive data management needs on Treasury staff on an ongoing basis.	Work with BRS to outsource, where feasible, data management tasks. Work with third party data providers in advance to establish working relationships with BRS
Vendor (BRS) may not deliver on functionality presented during the evaluation stage	As part of the implementation, define a test plan and acceptance criteria;
	Conduct structured user acceptance tests to validate that functionality promised has been delivered
Vendor (BRS) may not deliver on service levels presented during the evaluation stage	Clearly define a service level arrangement (SLA); incorporate key elements of the SLA in the contract. Define key performance indicators and assign incentives and penalties for critical items
Cost of BRS solution may escalate in future years	Scrutinize BRS contract terms to identify price escalation potential based on future growth and changes to asset mix / portfolio structure. Work out pricing structures that favor Treasury future plans for changes to investment structure
Cost may be higher than expected due to third party costs (currently embedded in services that may be replaced).	Identify all related costs (market data, other licensing costs) up front. Work with third parties to identify costs and enter contractual negotiations with third parties
Treasury staff may continue with current processes with new solution	Create desired target processes through BPR sessions. Define a change management framework to ensure that target processes, roles and responsibilities are adopted
	Manage communication and work with all impacted parties to ensure that target processes are adopted

All risks outlined above are deemed to have a low to moderate occurrence probability with moderate to high impact potential.

Preferred Operating Model: BRS Front & Middle Office + SSB or BRS Back Office

Phase II

Front Office

Portfolio Management – Equity & Fixed Income

Portfolio Analytics Portfolio Modeling Portfolio Optimization Portfolio Rebalance Order Generation

Pre-Trade Compliance

Trade & Order Management

Trade/Order Capture Trade Execution
 Trade Validation Trade Monitoring
 Trade Allocation Exception Handling
 Trade Routing Trade Accounting

Middle Office

Trade Operations

Trade Confirmation Clearing
 Trade Recon Trade Settlement
 Pos. Recon (IBOR – Custody) Cash Management

Compliance

Post-Trade Compliance
 Reporting & Disclosure
 Governance & Oversight

Risk Management

Credit Risk
Operational Risk
 Market Risk

Data Support & Mgmt

Market Data Services Data Storage
 Reference Data Mgmt Data Delivery
 Corporate Actions Governance & Stewardship

Performance and Attribution (IBOR)

Performance Measurement Performance Attribution
 Composite Performance Performance Analytics

Back Office

Investment Accounting

Portfolio Recon (Custody – ABOR) Performance Measurement (ABOR) P&L
 Valuation Regulatory Reporting Pricing (ABOR)

TA

Records Handling
 Proxy/Agent Services

Custody

Account Admin
 Securities Admin

Client Statements Acct Open/Close/Chg
 Client Reports

Fund Administration and Support

Fin Cntrl/Oversight Fund Ops Support Collateral & Margin Mgmt Income, Fees & Expenses Internal Reports / MIS

BRS Aladdin + Middle Office
 Accounting Decision BRS or SSB New
 Out of Scope
 OST
 Accounting Decision BRS or SSB New with OST

TAB 4 – BLACKROCK SOLUTIONS

BlackRock Solutions Overview

Oregon Investment Council

August 13, 2014

- 1. BlackRock Solutions Introduction and Overview**
- 2. Aladdin: Enterprise Investment Platform**
- 3. Operations Outsourcing**
- 4. Risk Advisory and Consulting Services**

BlackRock Solutions Introduction and Overview

Managing investments in the new world

BlackRock Solutions sees four, primary themes impacting investors in 2014 and beyond:

As investor look for yield, portfolio composition and
asset complexity has
outpaced the capabilities of most investment and
risk management systems

Investors and boards are seeking to achieve
**best practices in
risk management**

For certain Investors, the proportion and breadth of
**internally managed
assets** is increasing

Increased internal asset management, regulatory
changes and a heightened focus on compliance
and auditability require firms to improve their
operational controls

Investors can leverage the expertise of an experienced partner to address the challenges and opportunities arising from these four themes.

Understanding Oregon State Treasury Requirements

Based on discussions with the Oregon State Treasury (OST), BlackRock Solutions (BRS) has learned about OST's challenges and goals:

- ▶ Need to implement systems and transform business processes to better support the management of investments:

Infrastructure Objectives

1. Reduce Operational Risk & Improve Staff Efficiency
2. Improve transparency of the portfolio's exposures and risks
3. Increase the sophistication of analytics and the frequency of reporting for OST and the OIC
4. Establish an independent risk management oversight function and implement risk governance
5. Implement an enterprise investment platform from a partner with a proven track-record

Additional information on challenges and objectives provided as Appendix A

- ▶ Over time manage more assets in-house to lower costs and recoup fees paid to external managers
 - Similarly creates a demand for systems and best-practice operational processes

In choosing the right platform to meet these objectives, OST should consider impact on resources

- ▶ Implementations of “multi-vendor components” and installed software require significantly greater resources and expertise compared to integrated enterprise platforms and service providers
- ▶ Migrating middle office functions currently supported by the front office to a dedicated team requires operational expertise and resources; Pension plans that lack internal resources can should consider business-process outsourcing
 - Quicker time-to-readiness compared to staffing internally
 - Achieves implementing industry best-practices to reduce operational risks
 - Scales efficiently when more assets are brought in-house

How we work with clients

BRS leverages our unique Aladdin platform and resources to combine capabilities and services and tailor them for clients

- ▶ Each client's unique business situation may align in a single, or span multiple, verticals

Significant asset management, process and risk expertise

\$15tn in assets processed each day for BlackRock and 175+ external clients

BRS has expertise and support for fixed income, equities and alternatives, domestic and global mandates, active and passive strategies, public and private markets and OTC derivatives

Investment and risk systems delivered as a service

Aladdin is a centralized investment platform that combines risk analytics w/ portfolio management, trading and operations tools

Multi-asset risk reporting and interactive tools through Aladdin Risk

Services minimize the typical burden on I.T.

Outsourcing Services

Combination of Aladdin + highly experienced team to facilitate middle office operations and administration services

Outsourcing services for an asset manager by an asset manager

GASB investment accounting across internal and external assets

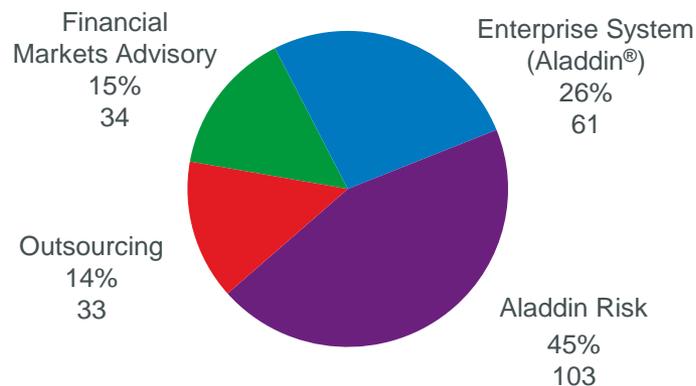
Risk Advisory Services

Advise on, structure, and implement risk governance frameworks, customized risk dashboards and bespoke portfolio solutions in accordance with clients' unique investment and risk objectives

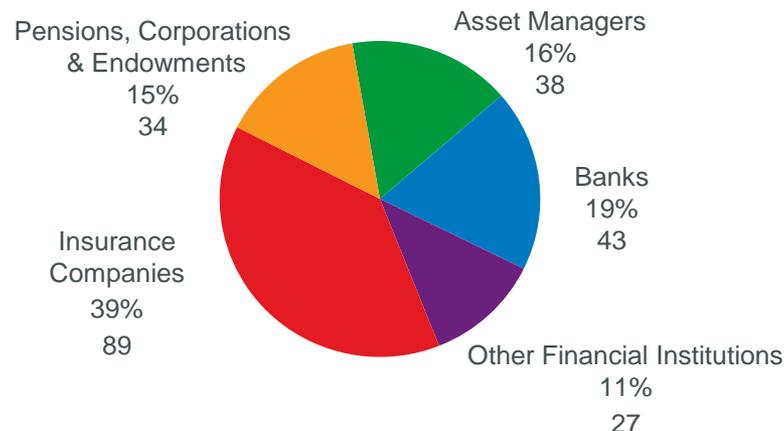
BlackRock is built to deliver solutions based on best-practices

Representative clients

By Service



By Client



Representative Ongoing Assignments

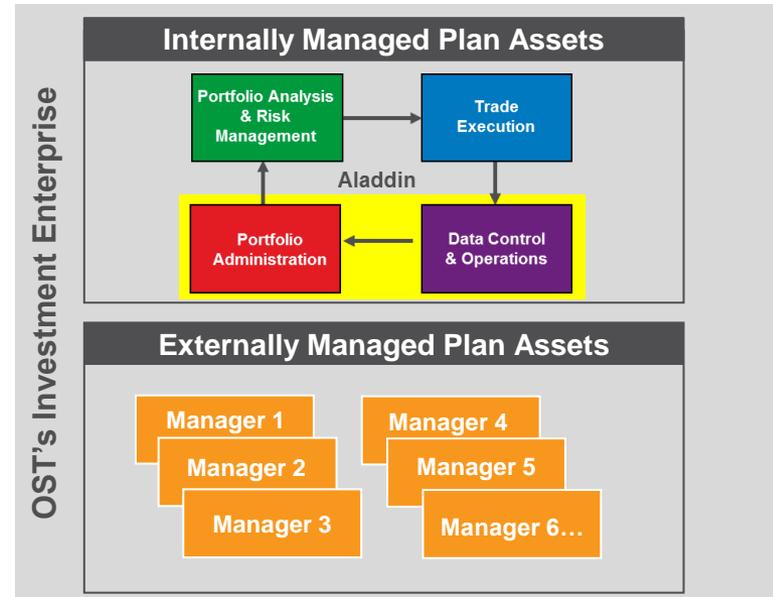
Asset Managers	Banks & Financial Institutions	Insurance Companies	Pensions & Corporations
AMP Capital Investors	Ally Bank	AEGON	AT&T
BlackRock	FHLB-Atlanta	Aetna	CalPERS
Charles Schwab & Co.	Freddie Mac	AFLAC	CalSTRS
Colonial First State Asset Management	JPMorgan	Allstate	Google
Columbia Management	Mizuho Bank	Arch Capital	GuideStone Financial Resources
Commonfund	Nomura Holdings America	Aviva Investors	HSBC UK Pension
Deutsche Asset & Wealth Management	OneWest Bank	Brit Insurance	Orange County Employees Retirement System
DIAM	PNC Financial Services	ING Investment Management	Pennsylvania Public School Employees' Retirement System
Guggenheim Capital	Regions Financial Corporation	Liberty Mutual	Pension Fund Assoc.
Mizuho Financial Group	GIC Private Ltd.	Munich Re	UK Coal Pension
Morgan Stanley Investment Management	Sumitomo Mitsui Trust Bank	NLI International, Inc.	VicSuper
Pioneer Investment Management, Ltd.	UBS AG	NY Life Investment Management	Virginia Retirement System
SEI Investments	Union Bank	Prudential Investment Mgmt	
Sumitomo Mitsui Asset Management	Walter Investments	Swiss Re	

Represents ongoing assignments as of 30 June 2014. List is a representative sampling of clients based upon mandate, client type, and geographic location who allow their names to be publicly disclosed as of 30 June 2014. Disclosure does not indicate approval or disapproval by such client of BlackRock Solutions or of the services provided.

BlackRock Solutions partnership opportunity

BlackRock Solutions proposes a comprehensive solution to help OST meet its objectives

- ▶ BRS will provide Aladdin as the enterprise investment management system for both internally and externally managed portfolios
- ▶ Aladdin's risk components will provide OST with total plan exposure, analytics and risk measurement reporting
 - Aladdin's risk components can also be coupled with risk advisory consulting tailored for CIO and CRO functions
- ▶ BRS provides middle-office investment operations outsourcing
 - Operational processes facilitate transparency and STP
- ▶ BRS provides Investment Accounting, a potential Phase II initiative



Large projects and system conversions involve significant change. Choosing the right partner is key

- ▶ Mitigates project risk, increases the probability of success and may eliminate need for future system conversions

BRS recognizes that as firms evolve they may wish to in-source functions

- ▶ Given the strong partnership between our firms, BRS will provide all of the training and expertise to OST whenever the decision is made to in-source

BRS support of the Investment Process

BRS can provide OST with services to support the full investment lifecycle

- ▶ While BRS provides Investment Accounting, like Custodians, we are not a Custodian



A partner with an integrated approach will allow OST to:

- ▶ Reduce operational risks and improve staff efficiency
- ▶ Minimize internal resourcing to implement such change
- ▶ Minimize the number of vendors needed to support objectives, meanwhile achieve simplicity and improve the probability of success
- ▶ Achieve a unified and consistent view of data
- ▶ Establish full transparency and automation between the internal investment teams and the outsourcer

Aladdin: Enterprise Investment Platform

Aladdin overview

Aladdin combines sophisticated risk, exposure and performance analyses with comprehensive portfolio management, trading, compliance and operations tools on a single platform

- ▶ Single version of Aladdin used by BlackRock and 60 clients, with a dedicated instance for each client
 - Flexible and configurable to support unique needs of each client organization
- ▶ Global and highly scalable platform – single instance of Aladdin used by organizations with 20+ offices and \$500bn+ AUM

Integration of people, processes and systems through one centralized platform and database

INTEGRATION OF PEOPLE, PROCESSES AND SYSTEMS



Aladdin provides front, middle and back-office functionality



Portfolio Management & Trading

- ▶ Daily risk exposure reporting
- ▶ Pre-trade analytics
- ▶ Credit exposure management
- ▶ Order modeling & allocation
- ▶ Automated rebalancing
- ▶ Order management
- ▶ Trade execution & capture
- ▶ Real-time risk & cash reporting

Compliance

- ▶ Pre & Post order/trade
- ▶ Real-time compliance monitoring
- ▶ Daily exposure limit monitoring
- ▶ Historical tracking

Security Data Management

- ▶ Spans all product types
- ▶ Multiple sources and audit trail

Operations

- ▶ Trade confirmation & routing
- ▶ Fail/settlement tracking
- ▶ Cash & position reconciliation
- ▶ Corporate action processing
- ▶ Payment processing
- ▶ U.S. mortgage processing
- ▶ Derivative documentation
- ▶ Collateral management
- ▶ Variation margin processing
- ▶ Operations/data reporting

Communication with Third Parties

- ▶ Brokers and Electronic Platforms
- ▶ FIX and SWIFT
- ▶ Omgeo OASYS/CTM and DS Match
- ▶ MBSCC/FICC

Risk Management

- ▶ Ability to view risk from individual security to enterprise level
- ▶ Value-at-risk, tracking error, stress testing

Performance

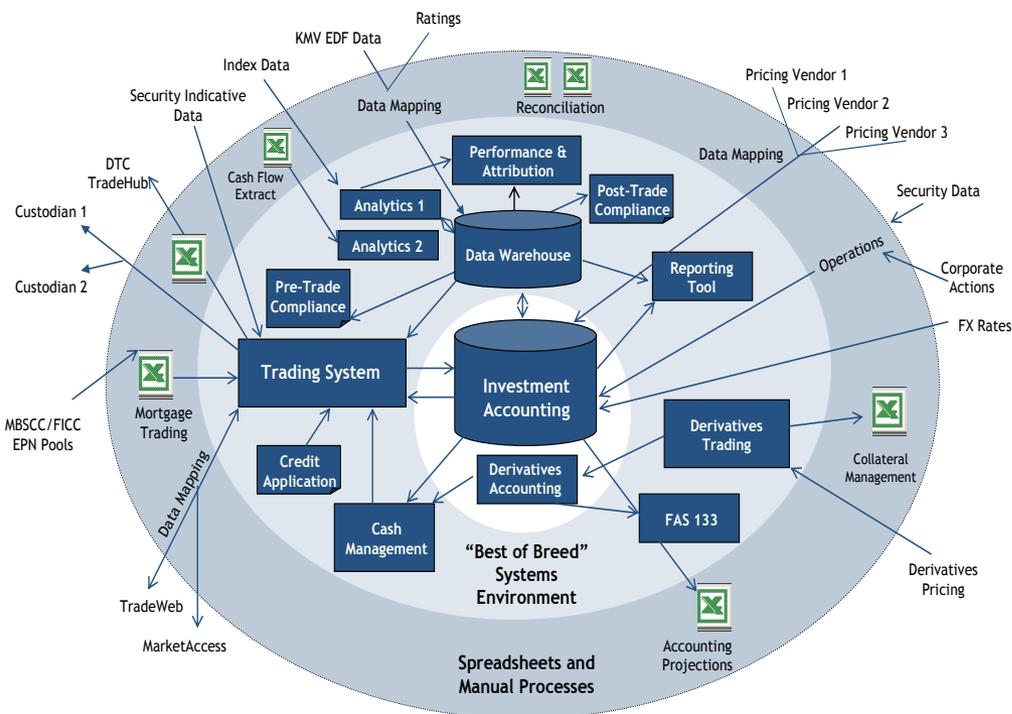
- ▶ Analytics Returns
- ▶ Performance attribution

Reporting Tools

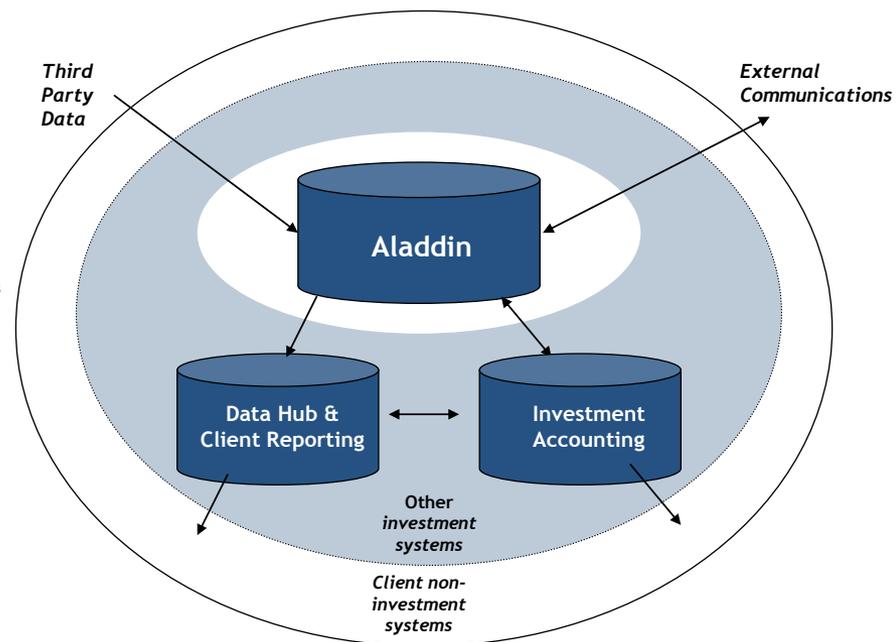
- ▶ Online access to:
 - Transactions & positions
 - Security indicative data & prices
 - Risk
 - Fails & matching
 - Compliance
 - New Cash

Infrastructure drives efficiency and information transparency

Multi-Vendor Environment



Aladdin Environment



- Many systems, offline spreadsheets and operationally-challenged manual processing
- Requires resources to control all interfaces with internal resources and systems
- Results in excessive reconciliations and data challenges
- Often referred to as “weakest link in the chain” model

- One Database, One System, One Process for the entire organization - All portfolios, all product types
- Full information transparency
- High degree of automations and Straight-Through Processing
- Result: Simplicity, Control, Efficiency, Scalability

Aladdin is a Service, not software

Comprehensive and high-touch service is critical for resource constrained organizations

Relationship Management (225)

Act an extension of client in-house teams

Partner with clients to support business process design and implementation, ongoing training and system configuration services

Data, Analytics & Production (550)

Data and Analytics “Factory”

Build and maintain leading risk models, and create and quality control data and analyses on behalf of clients

Development & Technology (1,000)

Continuously evolving platform

Delivered as a hosted service, including the Aladdin technical infrastructure, system administration & all enhancements

- **Implementation Services**
- **Daily Risk Reporting**
- **Data and Interfaces**
- **Technology and Facilities Management**
- **Systems Operations and Administration**
- **Ongoing Enhancements and Support**

- **Allows clients to focus on core business responsibilities, not system and data issues**
- **Aladdin and business processes evolve continually with the Aladdin Community**
- **User-provider model ensures an understanding of the key issues facing investors**

Implementation services

The key to a successful project starts with the implementation

Technical Infrastructure	<ul style="list-style-type: none">• BRS installs and configures the technical infrastructure required to operate Aladdin• This includes incorporating clients into BRS' Disaster Recovery plan
Data Conversion	<ul style="list-style-type: none">• BRS pre-loads portfolios in order to assess the accuracy and completeness of its security master
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Operations Outsourcing

Operations outsourcing overview

BRS provides middle-office operations outsourcing services customized to the specific needs of clients

- ▶ Natural extension of BlackRock's own business

Best-in-class technology platform facilitates middle-office operations and administration services

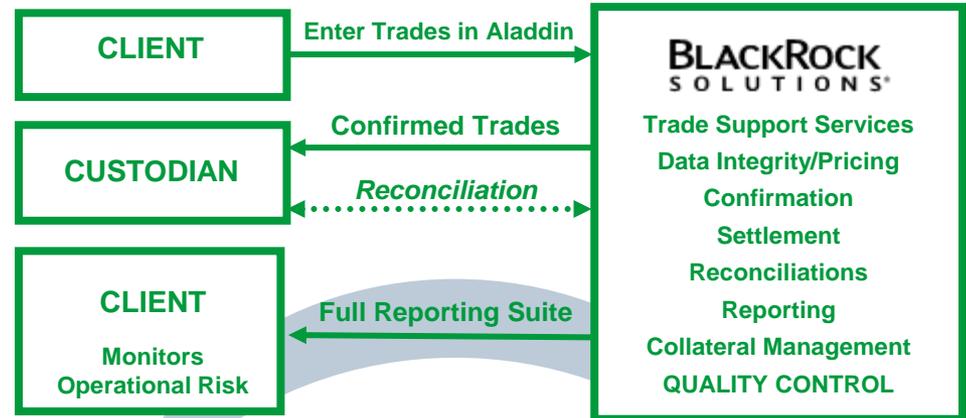
- ▶ One system, one database, one platform – used throughout the entire investment process
- ▶ Highly automated, scalable, and controlled operating infrastructure
- ▶ Full information transparency through a shared Dashboard

Proven process knowledge with a highly experienced team

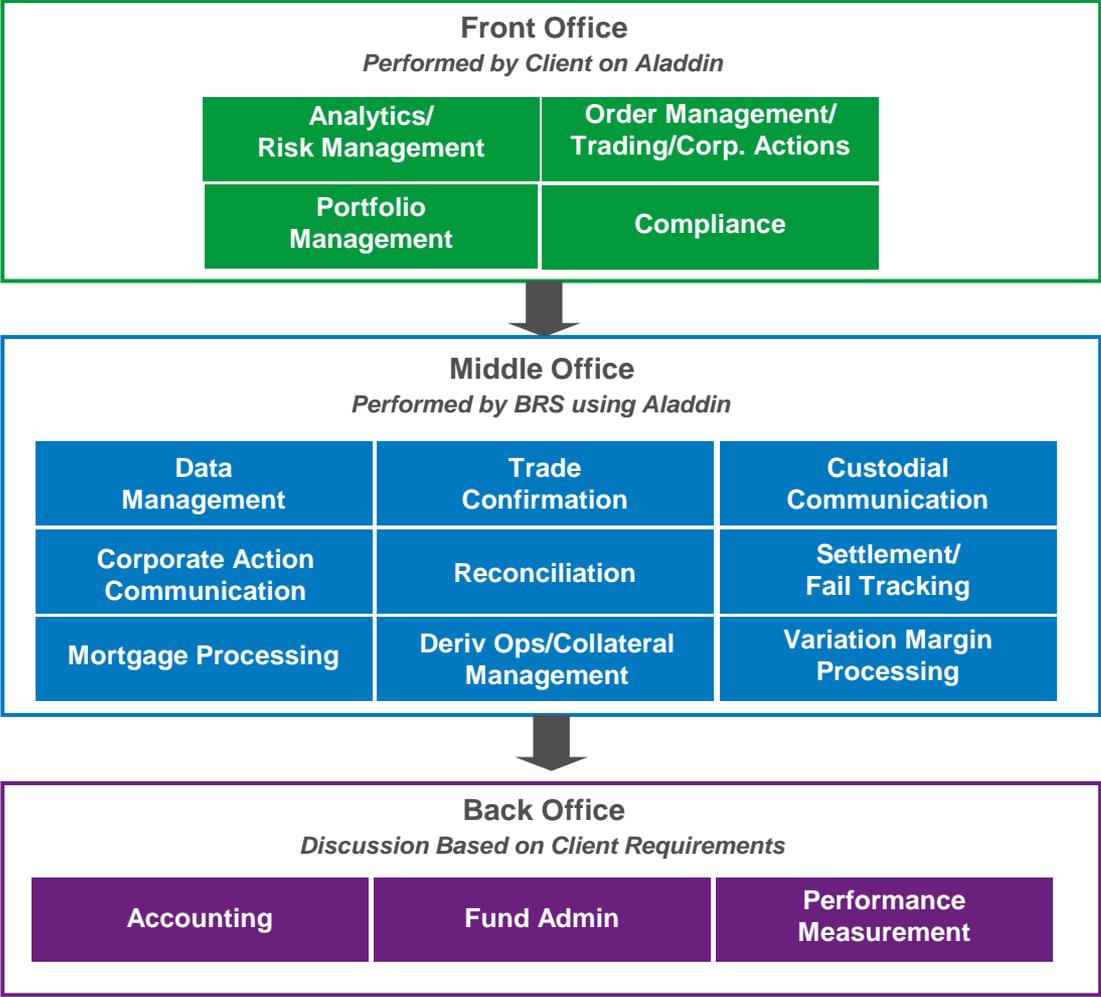
- ▶ Providing these services to BlackRock for 25+ years
- ▶ Business process consulting is a core competent of the service

Outsourcing services for an asset manager by an asset manager

How Does it Work?



Operations Outsourcing - Scope of available services



BRS Outsourcing with Aladdin

The ultimate combination of client utilizing Aladdin in the client's front office coupled with BRS providing outsourcing services provides unparalleled benefits:

**One system,
One database,
One process**

- Full information transparency across the investment chain - everyone can monitor the workflow and operational processes through common dashboards
- Allows the organization and its outsourcer to speak the same language
- Eliminates need to interface/reconcile multiple systems and maintain data in several places

**Real-time
Information
Transparency**

- Portfolio and risk managers benefit from real-time view of exposures, positions (adjusted for trades and corporate actions), cash balances, collateral positions...
- Easy oversight through real-time reporting of trade errors and fails

**Service,
Not Software**

- BRS is responsible for all technology hosting and system administration; Client will be alleviated from technology and interfacing challenges
- Throughout the life of the relationship, BRS will provide a variety of services including daily risk reporting
- Clients continually have access to new enhancements incorporated into Aladdin

- *Highest levels of data consistency and quality*
- *Timely information for managing the portfolio*
- *Reduced operational risk*
- *Ensures front office is not constrained by middle/back office systems or data challenges*
- *Platform that evolves with industry best practices*
- *Fastest time to implementation*

Alternatively, BRS has several clients who use Aladdin for the front office and outsource operations to a custodian who uses the same Aladdin platform to perform operations functions

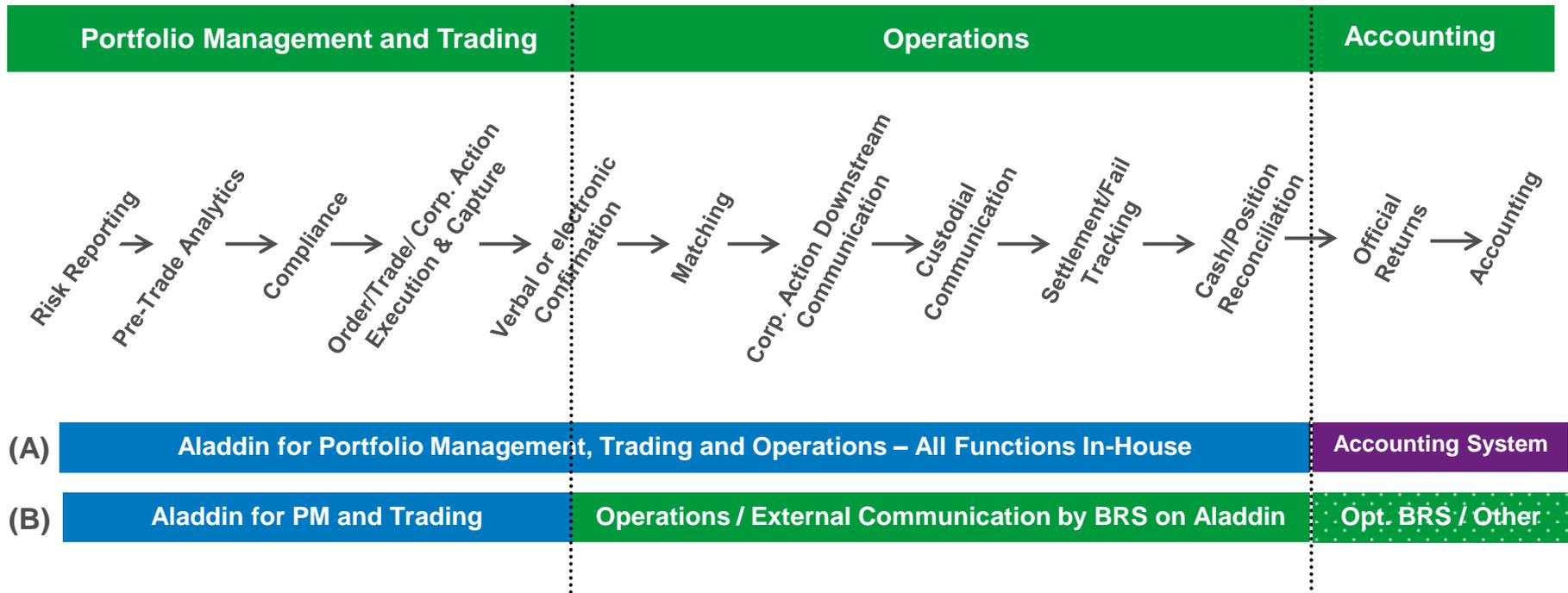
Operations Functions for Aladdin clients: Insourced or Outsourced

Aladdin is an integrated enterprise investment solution which fully supports Client's own internal users to perform the middle office and back office functions on Aladdin (Option A)

- ▶ Client's staff internally support the middle and back office functions on Aladdin

Client's who outsource the middle office functions to BRS follow the workflow outlined in Option B

- ▶ Below is a representation of potential workflows and process flows that exist under each alternative



Risk Advisory and Consulting Services

The Risk Advisory Toolkit – What We Offer

We provide risk tools, reporting, and advice in a broad range of areas depending on clients' specific needs and internal resources

Development of Enterprise Risk Framework

- Full risk function **business process review** with key stakeholders at **total plan level**
- Design and implementation of a **risk management framework**
- Review and provide input on key **governance** matters (e.g., Investment Policy Statement)
- **Independent review** of documents, policies and procedures; **data quality control**

Risk Function Support

- Implement customized **risk reporting and dashboards** utilizing BRS systems
- Multi-asset **risk-factor decomposition** and **contribution to risk**
- Design and production of **scenario analyses** and **stress testing**
- Access to ongoing support: presenting market themes and supporting risk-based recommendations

CIO and Investment Process Support

- Support for **portfolio construction**, **pro forma modeling**, and “**what-if**” analysis
- Design and implementation of **CIO investment dashboard**
- **Performance tracking** and **attribution**, coupled with **manager-specific research**
- **Risk budgeting** and **manager structure optimization**; **active-passive** decision-making
- Support for **asset (re)allocation** approval requests
- **Liquidity analysis**

Consultant Output Rollup and Aggregate Risk

- Rollup and integration of **manager performance reports**
- Integration of **performance analysis & return attribution** analysis into enterprise risk framework
- Rollup of actuarial (liability) analysis into the **Asset-Liability risk dashboard**
- Harmonizing tasks and promote production of more **integrated output from all constituents**

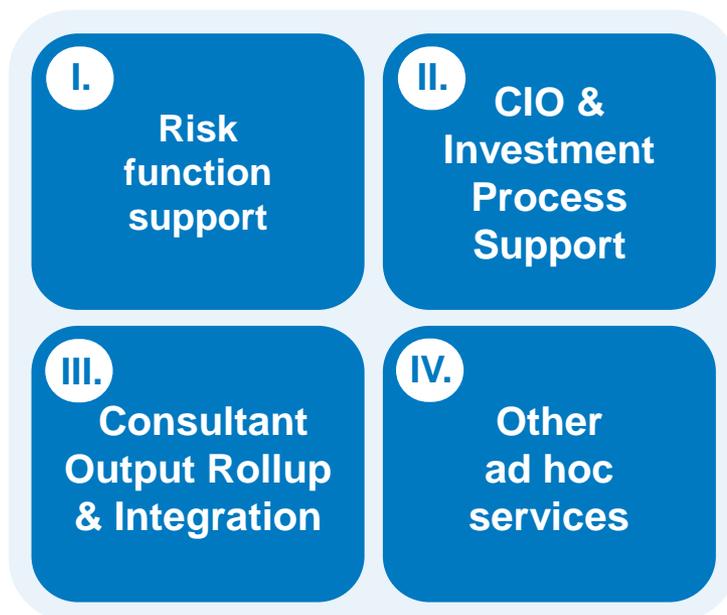
Training, Education, & Special Requests

- **Knowledge transfer** and **on-site training** of client staff on interactive tools and reporting
- Present on risk-related educational topics and provide **targeted training sessions**
- Support for **research projects** and ad hoc special requests

Proposed Risk Advisory Services for Oregon

Based on our discussions last year, we have organized our potential service offering into the below four categories

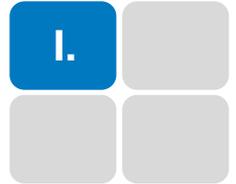
These services build upon Aladdin, which would function as the foundation for supplemental risk consulting services



I. Risk Function Support

Overview

- ▶ Design and implementation of a risk management framework
- ▶ Provide input into risk dimensions of Investment Policy Statement
- ▶ Develop risk reporting infrastructure, with consideration for eventual hand-off to OST staff
 - Bottom-up rollup of risk analysis from security level to the portfolio and plan levels
 - Assist in designing and producing agreed-upon risk metrics and measurements
 - Reporting and monitoring of portfolio exposures on a risk factor basis
 - Producing cash flow projections and analysis to facilitate liquidity analysis
 - Analysis and reporting of specific exposures (e.g., industry, sector, currency, manager style, etc.)
 - Exposure analysis to highlight implications of concentration risk, drawdown risk, etc.
 - Standardized suite of reports across range of risk and performance metrics
 - Asset-Liability views
- ▶ Support for governance and oversight by the Oregon Investment Council (“OIC”)
 - Design and support of communication materials for regular and special meetings
 - Support for periodic review and amendment to the *Statement of Investment Objectives and Policy Framework*
- ▶ Support for investment strategy and manager selection
 - Supplement standard materials for strategy approval in line with risk principles and impact of portfolio construction



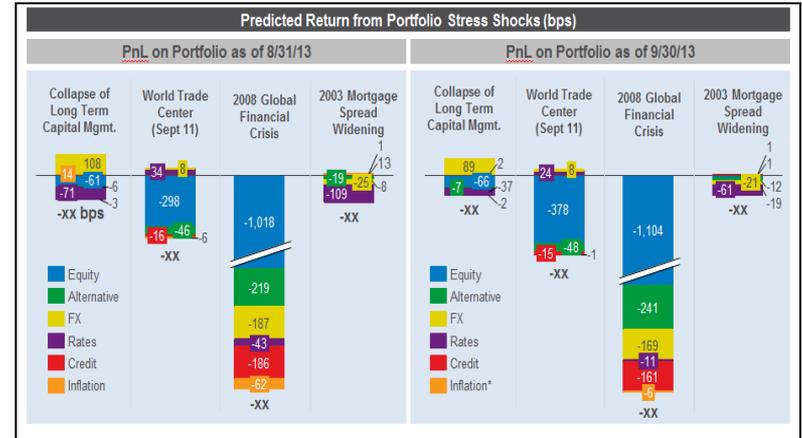
I. Risk Function Support

Board-Level Reporting

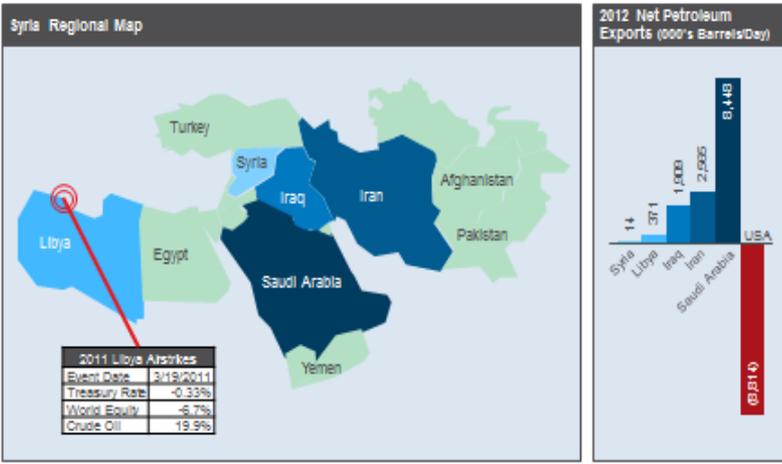
Portfolio-Level Risk Decomposition and Analysis



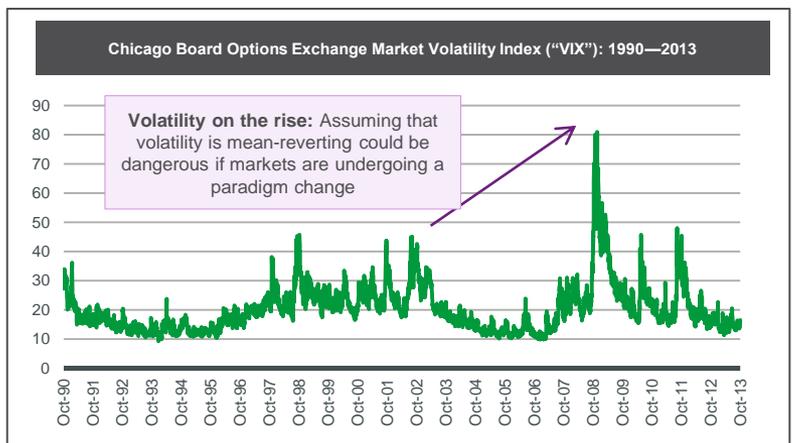
Historical Stress Testing: P&L by Risk Factor



Custom Event Modeling



Market Analysis

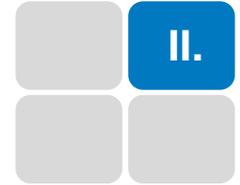


II. CIO and Investment Process Support

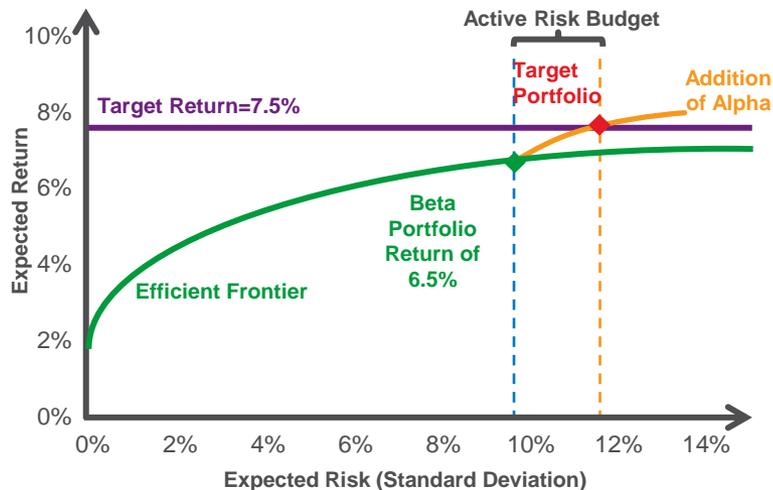
Strategic Asset Allocation

Support for Investment Processes related to Strategic Asset Allocation, including:

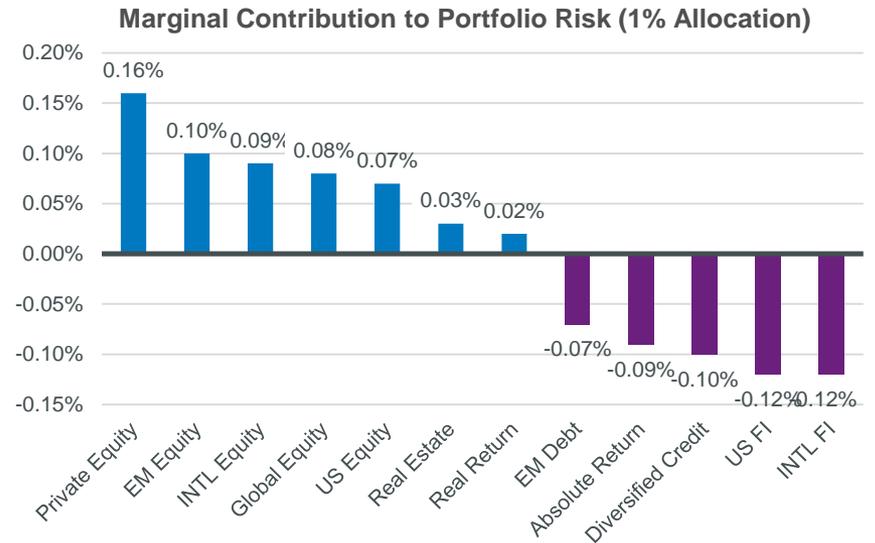
- ▶ Portfolio construction, pro forma modeling, and “what-if” analysis
- ▶ Strategic asset allocation
- ▶ Risk covariance analysis
- ▶ Total and active risk budgeting
- ▶ Support for asset (re)allocation approval requests
- ▶ Liquidity analysis



Total and Active Risk Budgeting (Illustrative)



Bottom-Up (Factor-Based) Analysis of Decisions



Calculations performed using BlackRock Solutions Aladdin risk model as of December 2013 from the trailing 400 weeks of equal weighted observations

II. CIO and Investment Process Support: Dashboard Design and Implementation

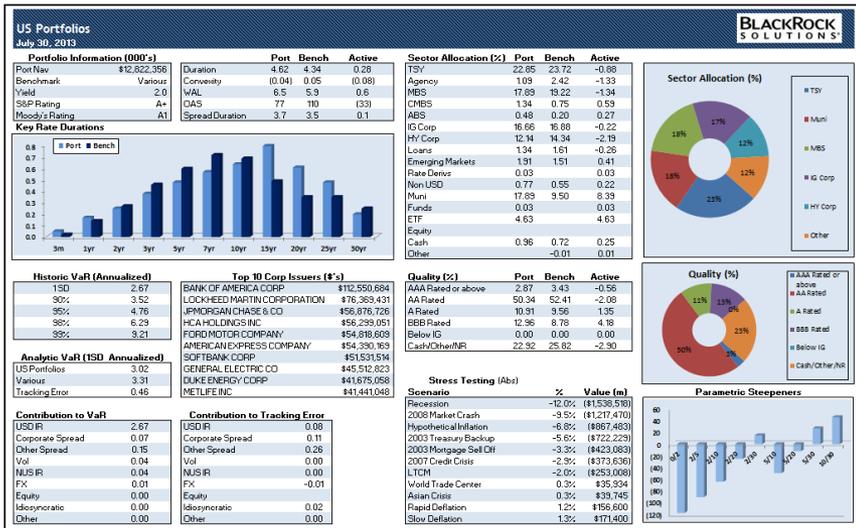
Custom dashboards: Present both portfolio-related metrics around risk and performance and market related views to assist investment decision making

- ▶ Collaborate with OST to determine the most helpful metrics that will be relevant and actionable
- ▶ BlackRock sources best thinking and best practices from across the firm, investment views, and client interactions to determine best practices for dashboard design
 - Appropriate views for individual asset allocations, asset classes, and sector components
 - Special attention to risk rollup for Private Equity component of portfolio



Regularly updated and presented with commentary at agreed upon frequency

Portfolio Risk and Performance Dashboards



Investment Dashboards



II. CIO and Investment Process Support

Manager Analysis and Return Attribution Analysis

Client Solutions brings to bear BlackRock's best thinking around assessing investment strategy and evaluating the performance of that strategy

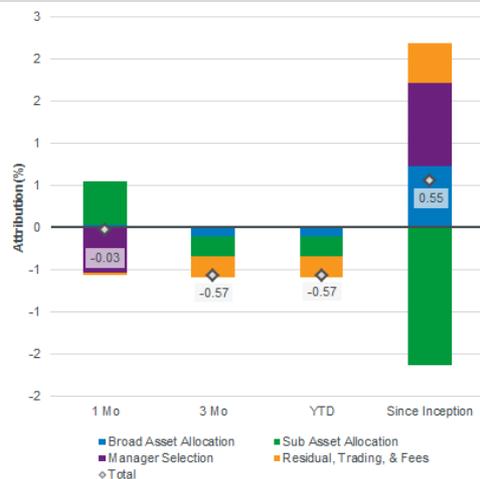
- ▶ **Investment Strategy Assessment:** Advice on objectives, risk tolerance, and constraints, including investment policy statement
 - Benchmark consultation on aggregate portfolio, asset class, and strategy / manager
 - Manager structure optimization and pro-forma modeling including sensitivity analysis
- ▶ **Performance Analysis:** Performance reporting, attribution as well as managing outliers
 - Includes dashboards / monitoring, portfolio / manager deep dives, and manager style analysis
 - Ongoing Analytics including asset and risk-based decomposition, historical look-backs
 - Detection and attribution of outliers and actionable recommendations



Attribution Summary

Return	1 Mo	3 Mo	YTD	Since Inception ¹
Portfolio Return %	0.02	0.82	0.82	10.50
Benchmark Return %	0.05	1.39	1.39	9.95
Active Return %	-0.03	-0.57	-0.57	0.55

Attribution	1 Mo	3 Mo	YTD	Since Inception ¹
Broad Asset Allocation %	0.03	-0.10	-0.10	0.72
Sub Asset Allocation %	0.51	-0.24	-0.24	-1.63
Manager Selection %	-0.54	0.01	0.01	0.99
Residual, Trading, & Fees %	-0.03	-0.25	-0.25	0.47
Official Active Return %	-0.03	-0.57	-0.57	0.55



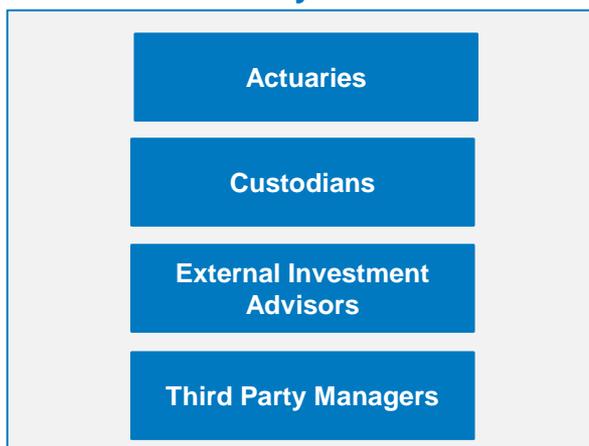
Sample performance analysis:
producing custom performance attribution that details manager, SAA, and TAA contributions

III. Consultant Output Rollup and Integration

- ▶ Rollup of actuarial (liability) analysis into the Asset-Liability risk dashboard
- ▶ Rollup and integration of manager performance reports
- ▶ Integration of performance analysis and return attribution analysis into the risk framework
 - Consolidate, integrate, and harmonize investment manager performance and risk metrics
 - Use consistent performance attribution methodology to monitor decisions across managers
 - Aggregate actuarial (liability) information in a consistent framework with asset related information
 - Use analytical tools to validate manager selection and monitoring program (including digitizing manager research)
- ▶ Potential support for review of consulting mandates and output to better harmonize tasks and promote production of more readily usable and integrated output from all constituents



Third Party Providers

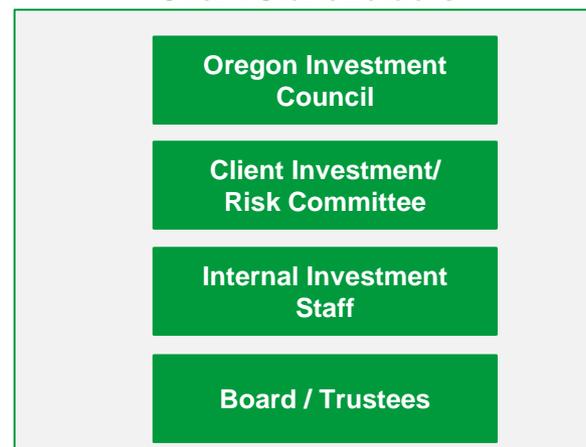


Aggregate and distill information



Interpret and reflect feedback

Client Stakeholders

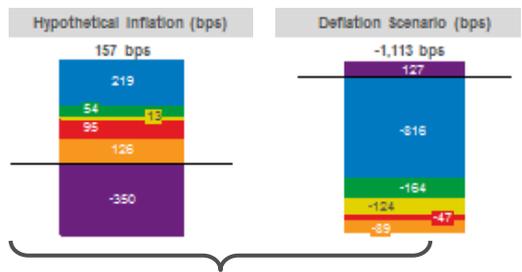


IV. Other Ad Hoc Services



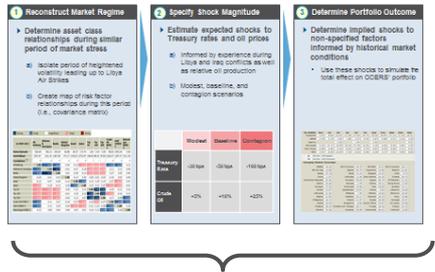
- ▶ Additional investment analysis support (as mutually agreed and scoped)
- ▶ Support for research project and special requests: (“Investment Beliefs” project, Policy and peer reviews and development of recommended changes)
 - Operational due diligence on existing or prospective investment managers
 - Support for customized portfolio analytics that are outside the scope of the standard Green Package
- ▶ Operational risk review: mapping and validation of process flows and trade operations
 - Vulnerability assessment around data, systems, key personnel risks, and business continuity
- ▶ Support for market and product education
 - Educational training for staff and/or trustees, including review of risk function, metrics, and reports
 - Transition and training plan for eventual hand-off of responsibilities to OST staff
- ▶ Other special projects (as mutually agreed and scoped)

Custom Historical / Hypothetical Analyses



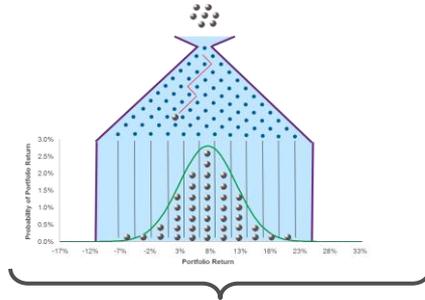
Example #1: Examine effects of inflationary and deflationary regimes on Client portfolio

Custom Risk Factor Simulation



Example #2: Examine portfolio performance under hypothetical rising rate scenarios.

Knowledge Transfer & Education



Example #3: Present to Client's Board on tail risks and the use of hedging instruments

TAB 5 – COMMON SCHOOL FUND

CSF Public Equity Manager Recommendation

Purpose

Staff recommends that the Oregon Investment Council retain ClearBridge Advisors, on behalf of the Common School Fund (CSF), as a mid-cap core domestic equity manager.

Background

The CSF is a trust/endowment-like fund managed for the benefit of K through 12 education in the State of Oregon. As of 30 June 2014, total fund assets exceeded \$1.45 billion dollars, with the following asset allocation:

CSF	Policy	Target	\$ Thousands	Actual
Domestic Equities	25-35%	30%	\$434,958	30.0%
International Equities	25-35%	30%	421,246	29.0%
Private Equity	0-12%	10%	153,407	10.6%
Total Equity	65-75%	70%	1,009,611	69.6%
Fixed Income	25-35%	30%	405,815	28.0%
Cash	0-3%	0%	35,319	2.4%
TOTAL CSF			\$1,450,745	100.0%

Discussion

The CSF domestic equity allocation (outlined above) is currently comprised of four active managers and one passive manager. The core large cap allocation is indexed at BlackRock in an S&P 500 mandate. Large cap value, large cap growth and small cap value are managed using three OPERF equity managers: MFS Advisors, Delaware and Boston Company, respectively.

Staff and Callan are recommending the retention of ClearBridge Advisors (“ClearBridge”) to replace Columbia Wanger as the Fund’s mid-cap core manager. Staff worked with Callan to conduct a search of potential managers, the details and criteria of which are provided under separate cover. Due diligence included quantitative analysis and manager interviews with the finalist firms. Karl Cheng, Public Equity Investment Officer and Michael Mueller, Deputy CIO, participated in the manager interviews.

ClearBridge is a SEC-registered investment advisor and a wholly-owned subsidiary of Legg Mason, Inc. With over \$106 billion in assets under management, the majority of which are concentrated in domestic equity strategies, ClearBridge is the primary equity sub-adviser for Legg Mason Partner Funds. The ClearBridge mid-cap core strategy has \$1.9 billion under management, including \$273 million in separate accounts, as of 30 June 2014.

The recommended ClearBridge strategy is co-managed by Brian Angerame and Derek Deutsch, who combined have three and half decades of investment industry experience, including nearly 15 years each at ClearBridge or its predecessor firm. Their investment management process begins with a quantitative screen, narrowing the mid-cap universe to approximately 400 “high quality” companies which are subject to further fundamental analysis by dedicated portfolio analysts and a centralized research platform. Ultimately, portfolio managers Angerame and Deutsch construct a portfolio of 55 to 80 stocks, with a maximum five percent weight in any one holding.

Stocks sought and held in this portfolio are expected to have the following characteristics: 1. Sustainable competitive advantages; 2. Strong balance sheets; 3. High returns on capital; and, 4. High free cash flow generation.

The rationale for this recommended manager change is summarized as follows:

1. Provides good upmarket capture when compared against the other managers in the CSF domestic equity allocation;
2. Exhibits a historically lower standard deviation and tracking error than the incumbent manager;
3. ClearBridge was the most “core” manager considered in the search, including less sector and more stock specific risk than other finalist firms;
4. Callan’s analysis confirmed ClearBridge’s high active share capture;
5. Moves CSF’s mid-cap core allocation from a commingled fund to a separate account structure; and
6. Offers a compelling fee-for-performance-only value proposition, a cost structure expected to be significantly lower than incumbent manager’s base fee.

While ClearBridge is not an existing OPERF manager, the additional monitoring related to a new relationship can be absorbed by the Deputy CIO working with Callan. It should also be noted that OPERF’s exposure to Columbia Wanger is in the form of a separately managed account with a slightly differentiated investment process from the commingled fund in which CSF is invested. Moreover, OPERF’s separate account has outperformed the commingled fund by 159 basis points, annualized, over the past five years.

Recommendation

Staff and Callan recommend that the OIC approve ClearBridge to manage a domestic, mid cap core equity allocation (approximately \$34 million at 30 June 2014) on behalf of the Common School Fund subject to the successful negotiation of terms and conditions with staff working in concert with the Oregon Department of Justice.