About the authors

Ümit Alptuna is a Vice President at Goldman Sachs Asset Management and COO of Goldman Sachs Investment Partners. Prior to joining Goldman Sachs in 2001, he was a manager in Business Assurance Services at PriceWaterhouseCoopers LLP in New York where he was responsible for overseeing audit engagements as well as providing guidance on technical accounting matters. He is a graduate of the Stern School of Business at New York University, a licensed CPA and a CFA Charterholder.

Contact: umit.alptuna@gs.com

Emmanuel D. (Manos) Hatzakis is a Vice President at Goldman Sachs Asset Management responsible for pricing analysis and strategies. Earlier, he held quantitative roles at Merrill Lynch's PWM and Equities divisions. Manos Hatzakis won the Daniel Wagner Prize for building a liquidity risk model to manage multi-billion loan portfolios, which also helped Merrill Lynch win the Alexander Hamilton Award. He is guest editor of the 'Production and Operations Management' journal, and wrote several articles. Manos Hatzakis earned a Ph.D. in Operations Research at Wharton. He is a CFA Charterholder and FRM.

Contact: manos.hatzakis@gs.com

Reha Tütüncü is a Vice President at Goldman Sachs Asset Management where he manages a team responsible for the optimisation platform used for quantitative portfolio construction. Prior to joining GSAM, he was an Associate Professor at Carnegie Mellon University. Reha Tütüncü received his Ph.D. in Operations Research from Cornell University. He is the co-author of the book 'Optimization Methods in Finance' and the author of many articles on the subjects of optimisation and quantitative finance in academic and practitioner journals.

Contact: reha.tutuncu@gs.com

2
A best practices framework for operational infrastructure and controls in asset management

ABSTRACT The increasing growth of the asset management industry, in both size and complexity, has highlighted the need for sound operational and control practices, especially in the rapidly expanding area of alternative investments. We present an operational and control policy framework that incorporates industry-wide best practices and reflects current thinking as shaped by the 2007–2009 financial crisis. We emphasise the importance of strong governance in effecting best practices and discuss operational elements, such as robust infrastructure and controls, reliable valuation and a holistic approach to risk management. Finally, we examine conditions under which the cost-effective strategy of outsourcing operational asset management functions can be successful for managers and clients.

2 A best practices framework for operational infrastructure and controls in asset management

by Ümit Alptuna, Manos Hatzakis and Reha Tütüncü, each a Vice President of Goldman, Sachs & Co. *Copyright 2009 by Goldman, Sachs & Co. All rights reserved.*

Introduction

The financial crisis of 2007–2009, which caused US households alone to suffer a $13 trillion decline in wealth [18], created opportunities to identify, study and remedy weaknesses in the asset management process that can be linked to poor operational and control practices on the part of asset management institutions.

Most asset managers aim to implement operational and control best practices. Industry experience suggests that the firms that succeed in properly implementing and adhering to these practices have typically established a strong governance process, and undertaken substantial investments in operational infrastructure, such as technology and skilled personnel. In this regard, asset management firms and hedge funds with a commitment to strong governance and the willingness and ability to make such capital investments, will have an inherent operational advantage.

In this chapter, we present an operational and control framework for asset management organisations that is based on industry-wide best practices and that incorporates lessons learned from the current financial crisis.[1] Our framework is flexible enough to allow firms to modify it on the basis of their size, resources, and structural and operational complexity.

Our discussion of operational and control best practices often focuses on hedge funds, because research indicates that their current practices are in substantial need of improvement.[2] The explosive growth of hedge funds in recent years, and the fact that they are often subject to less restrictive regulatory regimes, may, to a certain extent, account for their shortcomings. However, we believe that our framework is still relevant to mutual funds and other well-regulated structures with more crystallised operating practices because the industry landscape and regulatory regimes continually evolve. Time and events constantly shape and refine best practices as well.

1 Report of the Asset Managers' Committee to the President's Working Group on Financial Markets [6], Managed Funds Association [21], Alternative Investment Management Association [1], CFA Institute [10].

2 Kundro and Feffer [20] report, from the findings of a study initiated in mid-2002, that 54% of failed hedge funds had identifiable operational issues, and that 50% of failures could be attributed to operational risk alone.

The importance of governance in the investment management process

Before we begin to outline our proposed framework, we must address the issue of governance. We cannot overemphasise how crucial and catalytic the role of governance is in effecting best practices in an organisation. Extensively documented analysis of financial institution failures during the 2007–2009 period points to weak governance as the root cause of many of these failures (see, for example, O'Hara [22], Smith [24]).

At a very high level, quality governance begins with sound principles. It is incumbent upon each organisation to demonstrate an unwavering commitment to these principles and ensure that they take root in the firm's culture. An influential set of governance principles that investment professionals are encouraged to adhere to is the CFA Institute's Code of Ethics and Standards of Professional Conduct [11]. The CFA Institute has developed a handbook that enables in-depth study and interpretation of its Code and Standards [12] and a Code of Professional Conduct specific to Asset Managers [10].

Implementing a principle-centred governance process requires addressing a multitude of known issues and anticipating potential unknown ones that could emerge. Governance in the investment management process is so important that the CFA Institute has taken official positions on specific governance issues and communicated them to regulators and other entities in the US and elsewhere (found on the CFA Institute Centre website).

The CFA Institute's official positions on governance are summarised below (see [14] for details).

Board independence
An investment fund's board of directors must be an independent force in fund affairs, and at least two-thirds of its members must be independent. Since the board must safeguard the interests of investors, it must be structured to support independent decision-making and mitigate potential conflicts of interest. A supermajority of independent directors helps ensure that business issues affecting investors' interests can be addressed and important decisions can be made without undue influence from the fund manager or other interested parties.

Independent review committee
Members of the independent review committee have a duty to act in the best interests of fund investors. They must address the conflicts of interest inherent in the agreement between a fund and its investment manager. They should be compensated with fund assets, and not by the fund manager, to help reduce the manager's influence and reinforce their independence. Furthermore, the fund should clearly

and prominently disclose compensation figures for committee members, and how such compensation is determined, in their annual reports. The committee should have the authority to effect implementation of its recommendations by the fund so that investors' best interests are served. Committee members' liability should be based on a 'reasonable person' standard, so as not to deter highly qualified individuals from filling independent review committee positions. The committee should maintain adequate records and make those available to fund investors.

Transparency

Funds should disclose any sort of revenue-sharing arrangements they may have involving brokerage commissions. They must provide detailed information on adviser compensation, including benefits related to marketing efforts and long-term compensation related to an account. Fund expenses and sales loads for each share class should be clearly and prominently communicated. With regard to stock lending, firms should require clients to acknowledge, in writing, that they have received and understood information stating that the firms may lend clients' shares to third parties, and that doing so may cause the clients to lose voting rights.

Market-timing arrangements

Overall, funds should not permit their employees and clients to engage in market-timing practices, since such practices are detrimental to long-term investment goals. If applicable, funds should have to disclose to investors the risks of frequent purchases and redemptions, and their policies with respect to such practices, and explain in clear terms why market timing leads to long-term suboptimal investment outcomes. Funds that permit market timing should have to clearly explain how, and why, some investors engage in market-timing strategies, and under what circumstances such strategies are allowed. Funds that do not permit market timing should disclose their policies and procedures for detecting and preventing such practices and clearly explain how such policies and procedures will be effective.

Soft commissions and directed brokerage

As a general principle, brokerage is the property of the client. Managers should have to disclose to their clients that they may enter into bundled brokerage or soft commission arrangements prior to engaging in such activities, and subsequently provide full and fair disclosure of how clients' transactions are handled and commission benefits used. Plan sponsors and plan trustees should disclose all arrangements they have with investment managers and brokers. Managers should address conflicts of interest inherent in soft commission or bundled brokerage arrangements through a combination of increased disclosure and more precise definitions of what goods and/or services may be acquired under these arrangements. Managers should not use directed brokerage to reward a broker for selling the fund's shares to investors. (For more detailed guidance, please refer to the CFA Institute's Soft Dollar Standards [13]).

Conflicts of interest

Investment firms should prohibit reporting structures that could create conflicts of interest between corporate finance and trading departments, as well as between agency and proprietary trading desks. They should manage their conflicts of interest in ways that not only avoid self-dealing, but also avoid all outcomes that work against clients' interests. The fiduciary duty of investment firms to obtain best execution for their clients may be compromised if firms pay brokers to market funds to investors. Investment firms should adopt procedures to address certain conflicts created by personal investing, including restrictions on participation by investment personnel in the IPOs of equity or equity-related securities.

Proxy voting

Fund managers should enable clients to evaluate how proxy voting is handled, and should be held accountable for adopting proxy voting policies in alignment with investors' own objectives, so long as disclosures do not reveal how the fund manager intends to vote on particular issues prior to completion of the proxy process. Managers should designate a policy-making body, or individual, to recommend a proxy-voting policy and monitor its implementation. The policy-maker should develop clear proxy-voting guidelines and processes and be held accountable for their proper administration.

As an additional note on the topic of governance, we believe that a robust internal audit function will strengthen the governance process and will lend credence to it. The infrastructure of an asset management firm can be highly complex, especially if the firm offers a wide variety of products and maintains a global footprint (see Figure 1 for an illustration of the operational and control functions in asset management organisations). For this reason, external investors and operational due diligence managers may find it difficult to map out the entire governance process within an asset management firm, and determine whether the process is truly integrated and functions as intended. At best, these external parties can gain comfort in key areas such as valuation, cash controls and settlement. Because of their superior knowledge about the workings and structure of the asset management organisation, an internal audit team is often best positioned to uncover problems and weaknesses in the organisation's governance process. Internal audit best practices include a rolling audit process that covers the entire asset management business, and a review from the start of the trading process down to the settlement cycle. The audit should generate a clear list of actionable items with an indication of the seriousness of the control weakness.

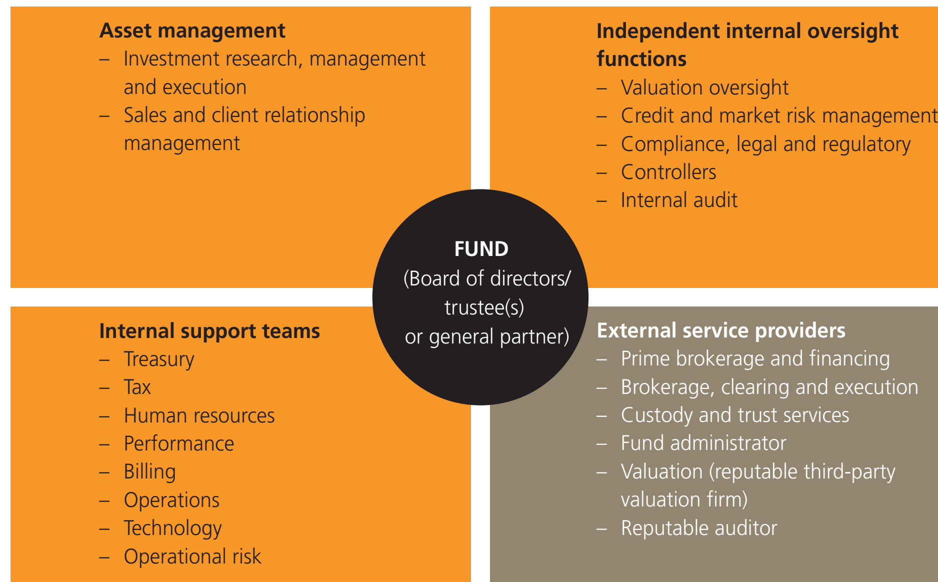

Fig. 1. Typical structure of an asset management organisation

These items are typically separated into risks that are mitigated by secondary and tertiary controls, and risks that are in need of immediate remediation. Equally important is a clear list of the actions undertaken by management to remedy the issues that surfaced during the audit, within a prescribed time frame.

Key issues pertaining to operational best practices

Best practices should not be viewed as an end in themselves, but as the means to address the objectives of stakeholders in the asset management process. The ultimate goal of best practices is to serve the interests of investors. Our discussion will focus on the interests of large institutional investors and High Net Worth (HNW) individuals, because these groups have access to hedge funds and other alternative investments where both anecdotal evidence and systematic analysis[2] show that operational best practices are less prevalent. Small retail investors are somewhat sheltered from poor operational practices because the investment vehicles available to them (mutual funds, for example), are subject to more rigorous regulatory oversight and legislation, such as the Investment Company Act of 1940.

Large institutional investors and HNW individuals must evaluate the ability of asset managers to serve their needs. In a Model Due Diligence Questionnaire for Hedge Fund Investors, proposed by the Managed Funds Association (see [21]), three key issues pertaining to operational best practices are highlighted:

Infrastructure and controls for supporting the integrity of the Net Asset Value (NAV) cycle
What is the organisation's current trading, portfolio management, and post-trade reconciliation and accounting infrastructure? Is third-party software used for the above? How are trades executed? What types of controls are typically used to prevent unwanted executions? What segregation of responsibilities is employed in the post-trade reconciliation process? How are cash or other assets transferred, both internally and externally? What types of controls are used to prevent unwanted transfers? How are trading errors handled? Who is the fund administrator, if any? Who are the main prime brokers used by the fund? Is there a written business continuity, disaster recovery (BC/DR) and crisis management plan? If not, how does the firm plan to maximise its ability to recover from business interruptions?

Valuation
What is the valuation process of the fund's positions, including positions that do not have a market price? What is the frequency of valuation? Are any third-party services employed in the valuation process, and, if so, how are these third parties monitored? Has the fund had any material restatement of its financial statements or any prior results since inception? Was the restatement the result of an audit by an external auditing firm?

Risk management
What is the organisation's risk management philosophy, and what approach is used in the management of the fund's: exposure to equity, interest-rate, currency and credit risk (as applicable); financing and counterparty risk; and operational risk?

To present best practices related to each of the three key issues above, we draw on the body of available research within the investment management industry, such as [1], [2], [6] and [21].

Infrastructure and controls

A robust operational infrastructure and control environment is increasingly necessary, due to heightened competition among managers, globalisation, complex investment and trading strategies, and the likelihood that regulatory requirements will become more and more stringent. In developing an operational and control framework, managers must take into account the size and complexity of their activities, and the requirements of their investment strategies. Essential elements of such a framework include ([6], [21]):

- policies and procedures to provide for appropriate checks and balances on operational systems and accounting controls, such as: counterparty relationship selection and management; cash, margin and collateral management; key service provider selection; robust infrastructure and operational practices; robust operational and accounting processes, including appropriate segregation of business operations and portfolio management personnel; and a BC/DR process;
- systems, infrastructure, and automation in proportion to the manager's scale of business and trading operations, including regular review of such infrastructure to assess operational risks in light of internal and external changes;
- a member of senior management vested with the responsibility of managing business operations, supported by internal personnel, or, where appropriate, external resources with the appropriate levels of skills and experience corresponding to the manager's operations; this senior manager, who can be a chief operating officer (COO), or a person with similar responsibilities, should coordinate and partner with investment professionals and senior legal, risk and compliance managers.

In the remainder of this section, we will discuss in greater detail certain issues that a manager's operational infrastructure and control environment should seek to address.

Counterparty selection and management

Typical counterparties include executing and prime brokers, banks, custodians and over-the-counter (OTC) derivative, stock loan, repo and cash management counterparties. Key factors in selecting counterparties include: creditworthiness, reputation, experience, identity, and the legal and regulatory regime (for example, insolvency laws and customer protection rules) of the counterparty, its parent company and affiliates, if appropriate; the level of service that the counterparty can provide in light of the manager's business needs (including complexity of products and frequency of trading), such as efficient transaction processing, reporting, clearing, and settlement; adequate financing capabilities; appropriate staffing to support the manager's business; and stability of the terms which the counterparty is willing to extend (such as term-funding lock-ups for prime brokers). The manager should negotiate and maintain, with all counterparties, signed agreements governing the terms of the relationship (with regard to, for example, account opening, prime brokerage, stock lending, ISDA, custodial arrangements and give-up agreements). Risks embedded in such agreements (such as terms that can increase collateral requirements) should be carefully evaluated.

Cash, margin and collateral management

The manager should have an effective framework, consistent with industry practices, for managing cash balances and processing margin or collateral calls from its prime

brokers, financing and OTC derivative counterparties. Compliance with credit agreements, and amounts and types of collateral needed to support positions, should be understood and monitored. Marks used by counterparties to value the fund's positions for collateral purposes should be verified; and margin calls must be verified and met in a timely manner. Investing excess cash should include the analysis of credit risk of relevant counterparties.

Key service provider selection and oversight

Key service providers should be selected based on reputation, expertise and the experience needed to support the manager's business, and include: providers of accounting, consulting and proxy services; IT vendors; legal counsel; fund administrators (where applicable); sub-advisers; and external portfolio managers. Selection and monitoring of service providers should take into account a provider's independence and control over its activities. Agreements with service providers should clearly delineate the service levels to be provided, and that they are appropriate for the manager's internal infrastructure and complexity of operations. The manager should monitor the quality of services offered by providers and be prepared to replace a provider whose quality of services becomes inadequate. Responsibility for any outsourced parts of the process must remain with the manager under all circumstances. The manager should appoint members of senior management to implement and monitor oversight procedures for outsourced activities.

Development and documentation of infrastructure and operational practices

The manager must develop and document infrastructure and operational practices tailored to its business, which will depend on the types of investments, frequency of trading, and the need for manual processing as opposed to the availability of automated systems. Implementation of the latter may be appropriate to reduce settlement risk, depending on the size and complexity of the organisation. Reporting policies must be established for resolving material breaks, errors, or other potential causes of loss to the fund. Business process monitoring, analysis and optimisation techniques should be employed to identify and address breaks and inefficiencies. If practical, the manager must aim to cross-train personnel or otherwise have appropriate back-up, so that key operations functions are not solely dependent on one individual.

Clearance, settlement and wire transfer procedures

As a minimum, the manager must adopt operational procedures for clearing and settling transactions, and for wiring funds. Such procedures may address: position and cash account reconciliation across prime brokers, futures clearing accounts, the fund administrator and front office, including prompt resolution of failed trades; authorised signatories, checks and balances, and other issues involved in cash movements;

segregation of duties between investment and operational personnel, including sending confirmations to non-trading personnel; use of industry utilities and software tools to automate OTC derivatives processes, and central clearing houses and/or exchanges for OTC contracts, if applicable; corporate actions, such as mandatory and voluntary elections, dividends, splits, and reorganisations; and management of positions with expiration dates, such as options, warrants, rights and conversions.

Trading of derivatives and other complex instruments and strategies
The manager must adopt additional infrastructure and operational practices, depending on its involvement and trading in OTC derivatives, and other complex markets, such as bank loans, mortgage-backed securities/collateralised mortgage obligations, structured credit, private transactions and transactions in overseas markets. Operational procedures for such activities are discussed in more detail in [6] and [21]. The manager should regularly assess the appropriate level of staffing and resources for complex or unique trading strategies from an operational and business risk perspective, and be willing to maintain that level.

Accounting procedures
The manager needs to have appropriate systems, processes, and personnel in place so that the trading activities of its funds, and all related contractual arrangements and agreements, can be properly recorded from an accounting perspective to allow for the calculation of both fund-level and investor-level net NAV as well as for the production of other important financial data necessary to meet investor, risk, financial statement, and tax reporting requirements. Systems should be in place that: maintain trading-related data (including quantity, cost basis, market value, realised and unrealised trading gains and losses, interest and dividends, and fees and expenses); summarise, in a general ledger format, trading and non-trading-related data, such as management fees and expenses; allocate fund-level results to the individual investor level; properly record, from an accounting perspective, non-trading related activities such as management and incentive fees, or other fees and expenses. A month-end-close process should be implemented to: verify the recording of any material valuation adjustments and non-trading-related activities; allocate fund-level NAV to individual investors; and prepare and distribute account statements to investors. Annual processes should be in place to produce: financial statements and related footnotes to be audited by the fund's independent accounting firm; and investor-level tax information, as needed by investors, according to the regulations promulgated by the relevant tax authority. Operational controls should be periodically assessed in light of changing business needs, particularly where there have been changes to the activities of the organisation. The manager should retain responsibility and oversight for any outsourced parts of the process. A daily profit and loss reconciliation process that is undertaken internally

and that shadows and duplicates many of the functions that a Fund administrator performs, is also advisable. When repeated daily, this reconciliation process should lead to a month-end NAV process that has fewer exceptions and to less sizable adjustments between the estimated monthly performance figure calculated intra-monthly and the official monthly performance figure established at the month-end close.

Information technology
The manager must establish policies and procedures to control changes to any information technology, including software, data, hardware, and infrastructure, as well as for information technology security.

Best execution and soft dollar arrangements
The manager must seek best execution in its trading activities for the benefit of each fund it manages. Factors to consider for best execution include, but are not limited to: prompt and reliable execution; the financial strength, integrity, and stability of the broker or counterparty; the quality, comprehensiveness, timeliness, and frequency of available research and market information provided by the executing broker; the executing broker's ability to execute transactions (and commit capital) of size, in liquid and illiquid markets, with minimal or no disruption to the market for the security; the competitiveness of commission rates in comparison with other brokers satisfying the manager's other selection criteria; and the ability of the executing broker to maintain confidentiality. Soft dollar (commission management) arrangements, including directed brokerage and commission-sharing agreements, may impact the evaluation of best execution. Therefore, a manager should determine whether brokerage and research services fall within the safe harbour as set forth in Section 28(e) of the Exchange Act [23]. If soft dollar arrangements fall outside the safe harbour provided by Section 28(e), the manager should ensure that such arrangements are consistent with its duties to its funds, and determine whether the products and services received fall within the disclosed usage of soft dollar arrangements. All soft dollar arrangements should be fully disclosed to investors in the funds' offering documents and Form ADV, if applicable. More comprehensive guidance about soft dollar arrangements is offered by the CFA Institute's Soft Dollar Standards [13].

Business continuity/disaster recovery (BC/DR) plans
The manager should establish a comprehensive BC/DR plan to mitigate financial loss in the event of disaster or other business disruption. The plan should include a business impact analysis to identify and prioritise critical processes. It should clearly articulate business recovery and resumption objectives. It may also include written procedures and documentation, test plans and test scenarios, and other procedures for

addressing unforeseen events in an emergency. Business continuity planning should cover all operational business functions and not be limited to technology-based BC/DR.[3]

Anti-money laundering (AML) programmes

Anti-money laundering is becoming an increasingly important consideration to be addressed by best practices. In the United States, Section 352 of the USA PATRIOT Act requires financial institutions to establish AML programmes [15]. At a minimum, such programmes must include: the development of internal policies, procedures and controls; designation of a compliance officer; an ongoing employee training program; and an independent audit function to test programmes. Managers should adopt and implement AML programmes consistent with Section 352 as a matter of sound business practice. The AML programme must be tailored to the manager's business and operations, including the nature and location of investors, relationships with third parties and applicability of AML rules to non-US jurisdictions.[3]

Valuation

If there is a single area that has the potential to expose poor operational and control practices in the eyes of the investor, it is valuation.[4] At all times, but especially during periods of market stress, investors are concerned about illiquidity and the mispricing of securities. As part of the pre-investment due diligence process, investors should be looking for hard evidence of a real valuation process, documented by policies and procedures, and monitored and enforced by a team that is separate from the portfolio management team. Because valuation issues are so important to investors, managers should strive to implement best-in-class policies and procedures in this area.[5]

The best valuation practices, as industry-wide evidence suggests, involve a layered approach that engages multiple parties both internal and external to the fund. In our view, best practice in this area is always associated with an uncompromising mark-to-market discipline that is operative at all times, not just during the month-end NAV cycle. Key to the integrity of the process is the strict segregation of pricing and verification duties, which should be performed by independent teams. External service providers need to be utilised. Independent prices can be sourced by the fund administrator or custodian. If hard-to-price assets are included in the portfolio, the services of reputable third-party valuation firms need to be retained. In such situations, the external valuation provider should offer a valuation range for the assets being priced independently, rather than a negative assurance letter that references a valuation estimate generated by the investment manager. The portfolio and key controls must be audited by a reputable external auditing firm.

3 More comprehensive guidance is given in [21].

4 Kundro and Feffer [19] report, from among the findings of a study undertaken earlier in the decade, that 57% of valuation issues implicated in hedge fund failures can be attributed to fraud or misrepresentation, 30% to process, systems, or procedural problems and 13% to mistakes or adjustments.

5 Useful guidance can be found in [2], as well as in [21], and [6], among other resources.

Valuation issues related to hedge funds assume greater importance because incentive fee arrangements are often present. Such arrangements enable hedge fund managers to participate alongside investors in the fund's performance, often in an asymmetrical, non-linear manner.[6] Incentive fees (also referred to as performance fees) align the interests of managers and investors and enable hedge funds to attract and retain top investment talent. If they are improperly structured, however, incentive fee arrangements create the potential for conflicts of interest between managers and investors.[7] Conflicts that may arise due to valuation and performance data may be mitigated, potentially, through the use of third-party providers to source such information.

The types of assets, in which a fund invests, will determine the nature and severity of the valuation issues that may arise, such as those listed below.

Liquid exchange-traded securities

Valuation issues are generally minimal or do not exist for such investments, since market price information is, in almost all cases, widely available and valuations are readily and independently verifiable.

Illiquid exchange-traded and OTC securities

If an investment has limited or non-existent trading activity, establishing its price is problematic and this will complicate the fund valuation process. Such securities include OTC derivatives where pricing information can only be obtained from brokers that deal in those derivatives. In some cases, the only pricing sources are the fund's trading counterparties.

Private investments

Such investments may not have a readily ascertainable market value after the initial transaction has been made, and may not have that until the investment is realised or redeemed. Potential valuation conflicts may arise with such investments.

Investors must understand what portion of a fund is comprised of hard-to-value assets. Financial Accounting Standard 157 (FAS 157) [17] defines a hierarchy of assets according to the reliability of available pricing information: Level 1 assets have observable market prices to a large extent, such as equities trading on major exchanges; Level 2 assets have observable market prices to some extent, such as OTC derivatives for which broker quotes are relied on for pricing; and Level 3 assets have largely un-

6 Stulz [26] provides a plain explanation of incentive fee structures in the hedge fund industry, and their differences from those available in mutual funds.

7 Anson [3] discusses potential misalignments between the interests of managers and investors resulting from the use of some incentive fee structures. Asness [5] suggests improvements in hedge fund fee structures.

observable market prices, such as private equity investments. Managers must report to investors the percentage of the fund in Level 2 and 3 assets at least quarterly, which is more stringent than the annual frequency that Generally Applicable Accounting Principles (GAAP) will soon require. If pricing models have to be used to value Level 2 and 3 assets, the quality of these models must be assessed by the independent team responsible for valuation, using analyses such as back-testing employed internally or by third-party providers.

Hedge funds increasingly use a mechanism called a 'side pocket' to separate illiquid assets with no readily available market value from more liquid investments. Investments placed in a side pocket are available to current, but not future, investors in the fund. Redemptions from side pockets are generally not permitted until an investment is removed from the side pocket upon realisation of a gain or loss. The purpose of side pockets is to protect investors by avoiding the need for them to enter or exit illiquid and unreliably priced investments. Most managers do not earn incentive fees on investments in side pockets until an investment is deemed realised and some type of market-pricing information becomes available. The use of side pockets must be governed by clearly defined guidelines that must define, among other things, if and when an asset should be moved into and out of a side pocket. Relevant considerations include the availability of evidence of value (for example, through market prices or broker quotes), the inherent difficulty in establishing a value for an investment, the nature of the market and the anticipated ability to enter or exit an investment. Valuation policies of side-pocketed investments should be the same as those for other investments.

Risk management

An investment manager must establish a comprehensive and integrated risk management framework that takes into account the size, portfolio management process and investment strategies of its funds. All potential sources of risk inherent in the manager's investment styles or processes need to be identified, understood, and, as far as possible, translated into relevant, measurable risk factors. Typically, a risk measure should estimate the impact of an event on the portfolio and the probability of this event occurring. Categories of risk could be widely recognised ones such as liquidity risk (including both asset and funding liquidity), leverage risk, market risk, counterparty credit risk, operational risk, legal, regulatory and compliance risk (each discussed below), or more specialised ones as applicable to a given portfolio. The impact of each risk factor on the portfolio should be measured under both normal and stressed market conditions. This impact also needs to be evaluated using both quantitative and qualitative criteria.

Although senior management should retain overall responsibility for risk management by empowering a chief risk officer (CRO) or a Risk Committee, industry-

wide evidence suggests that risk management needs to be addressed in a holistic manner. We envision a process that does not reside within a single department, but involves multiple areas throughout the organisation. Among the groups that need to interact continuously to define and monitor potential exposures quantitatively and qualitatively are 'Treasury', 'Operations', 'Legal', and 'Compliance'. Such activity can only occur in an organisation that enjoys strong governance, and which removes organisational barriers that impede necessary communication so that all the relevant groups can be brought together. The risk monitoring and management process should not be outsourced; senior management should maintain overall responsibility for it. If specific risk measurement functions are outsourced, senior management must ensure adequate understanding of the outsourced parts of the process and maintain responsibility for them.

The investment manager must ensure the integrity of the risk management function. Where practical, there needs to be segregation of duties, with different people responsible for the risk management function and for the investment management function. Periodic reviews by independent personnel or external parties must be performed to evaluate the continued robustness of the risk management process and ensure that controls and limits are being adhered to.

Principal categories of risk that the risk management process must address include those listed below.

Liquidity risk

This refers to the ability of a fund to meet its need for cash. A manager should evaluate the impact of factors that contribute to liquidity risk, including: (i) funding provided by lending counterparties, including terms of margin borrowing, (ii) redemption rights by investors and the amounts of capital involved, (iii) market liquidity conditions that could affect the manager's ability to sell securities with minimal adverse price impact.

Leverage risk

This refers to the practice of using borrowed funds to trade and invest. A manager should manage leverage carefully. For portfolios without derivatives, leverage may be defined as the market value of assets relative to the portfolio's capital. Leverage for more complex portfolios or portfolios containing derivatives may be estimated by analysing the risk of different strategies and understanding the potential for extreme losses arising from those strategies.

Market risk

This refers to the financial risk resulting from changes in the market price of a fund's positions. A manager should identify the size, direction and rate of change

of portfolio exposures to market risk factors, including equity indices, interest rates, credit spreads, currency exchange rates and commodity prices. Scenario analyses and stress tests should be conducted on portfolios at appropriate frequencies. Historical, forward-looking, or ad hoc scenario analyses must be used only after the advantages and limitations for each are clearly understood. Stress tests measure the vulnerability of a portfolio to shocks of single or multiple market factors by constant amounts or percentage moves. The manager must periodically review the performance of market risk models in use and adjust assumptions, inputs and model structures to better represent current reality.

Counterparty credit risk

This refers to risk of loss because of changes in creditworthiness or solvency of prime brokers, custodians, derivative dealers and lending, trading, cash management and depositor counterparties, as applicable. A manager must carefully monitor a fund's exposure to counterparties and understand the impact of potential counterparty loss of liquidity or failure, including the risk of business disruption. Diversifying through the use of multiple prime brokers and other counterparties should be weighed against the increased complexity and practicality of settlement, reconciliation and daily collateral management.

Operational risk

This refers to the risk resulting from inadequate or failed internal processes, people, and systems, or from external events.[8] A member of senior management not associated with the investment management process, a COO or similar, should oversee all operational areas. The manager should implement and maintain strong internal controls to minimise the potential loss resulting from operational risk. These controls may include, as applicable: (i) the use and maintenance of a centralised position data set; (ii) the adoption of trade capture devices; and (iii) the prompt reconciliation of trading information with the fund's prime broker or settlement agent and fund administrator (if any). A fund should monitor its overall level of operational risk, either internally or by using third-party reviewers. Elements subject to review could be (as applicable): (i) assets and products; (ii) staffing and resources; (iii) infrastructure (including information technology resources, BC/DR planning); and (iv) compliance and regulation.

8 Brown, Goetzmann, Liang, and Schwartz [8] propose a quantitative operational risk score ω for hedge funds that can be calculated from data in hedge fund databases. The purpose of the ω-score is to identify problematic funds in a similar manner to Altman's z-score, which predicts corporate bankruptcies, and can be used as a supplement for qualitative due diligence on hedge funds.
In a subsequent study [9], the same authors examine a comprehensive sample of due diligence reports on hedge funds and find that misrepresentation, as well as not using a major auditing firm and third-party valuation, are key components of operational risk and leading indicators of future fund failure.

Compliance, legal and regulatory risk

This refers to the risk of loss resulting from litigation or regulatory non-compliance. A manager should develop a comprehensive manual that will include all compliance policies to be adhered to in key operational areas to limit or mitigate the risk of regulatory non-compliance. A chief compliance officer (CCO) must be appointed to be responsible for ensuring that compliance policies are followed and enforced. A well-developed legal infrastructure is particularly important for asset managers that operate on a global basis. The legal team must ensure that the asset manager's legal entity structure is sound from a tax and regulatory perspective in the different jurisdictions in which the manager operates. The establishment of a new products committee that includes representatives from operations, technology, controllers, valuation, compliance, regulatory and legal groups is another best practice within the industry. This committee is tasked, in part, with reviewing each product before it is launched to ensure that the necessary infrastructure is in place and that legal, and regulatory, requirements and limitations are understood and accounted for in advance of the product's launch. The legal team must also monitor the ever-changing regulatory landscape on a global basis, so that managers can modify their strategies, policies and operational practices when necessary. Recent revisions to short-selling rules in many jurisdictions are an example of regulatory change that has had a profound impact on the investment strategies and operations of certain hedge funds.

Operational and control issues related to the management of multiple portfolios

So far, our discussion has focused on operational and control issues encountered in the management of a single fund. Additional issues arise in the management of multiple portfolios, such as separately managed accounts (SMAs) that share a common portfolio construction approach and may trade simultaneously.[9] We describe some of these issues in the sub-sections below.

Increased operational complexity

Managing multiple funds increases operational complexity for the investment manager. Data aggregation, trade allocation, selecting third-party service providers and working with multiple prime brokers are some of the key considerations.

9 A separately managed account (SMA) is an investment account owned by a single entity (typically an institutional or a HNW investor) and managed by an investment management firm. SMAs were developed in the 1970s to satisfy the needs of investors whose investment objectives did not match those of available mutual funds. Compared with mutual funds, SMAs offer investors flexibility through portfolio customisation, greater control of flows in and out of the portfolio, a certain degree of transparency, which increases investors' level of comfort with managers and their strategies (Black [7]), as well as greater tax efficiency. These benefits often come at the cost of higher fees.

The level of complexity is a function of how control over portfolio operations is apportioned between the asset manager and the asset owner (for example, the separate account holder). Generally, the asset manager must deploy more extensive infrastructure in cases where the asset owner exercises a lot of control over the selection of third parties, such as prime brokers, ISDA counterparts and fund administrators. In classic SMA structures, more control will rest with the asset owner, while the overhead will be more pronounced for the investment manager. Greater investment in technology and personnel will be required to address issues such as: investment restrictions for the SMA that differ from those that apply to the main fund; additional disclosure requirements, such as position transparency; and management of derivative counterparts and trading flows.

Fairness

Managers must adhere to fairness principles to ensure equitable treatment of all portfolios under management. On the trading side, at the very minimum, fairness dictates that any accounts that are trading the same security in the same direction on a given day with the same execution benchmark, will receive the exact same average execution price.

Cross-trades

One of the important issues that arises in the management of multiple portfolios is the possibility of a cross-trade, which is defined as the sale of an asset from one portfolio and the purchase of the same asset into another portfolio where both portfolios are under the control of the same manager. The Employee Retirement Income Security Act (ERISA) prohibits cross-trades in portfolios representing ERISA plans, unless they are consummated pursuant to an exemption [16]. When portfolio rebalancing needs require the manager to trade on opposite sides for two separate ERISA accounts, the manager must ensure that these trades are strictly separated and are channelled through different brokers to comply with the ERISA legislation.

Market impact

The market impact of a trade generally refers to the change in the price of the traded security as a direct result of that particular trade. While most of the market impact from individual trades is temporary and negligible, larger trades in illiquid securities may have a permanent market impact. When a manager trades a particular security for one of the portfolios it manages, it is inevitable that the market impact of that trade will affect the values of other portfolios under the manager's discretion that hold active positions in that security. Therefore, trading in one account has the potential to adversely affect other accounts managed by the same firm. While this does not constitute a violation of fairness, the manager must disclose this possibility to all its clients. In addition, the manager must ensure that each account has an equitable share

of the trading opportunities based on new information so that market-impact effects from trades across all accounts are also equitably experienced. This can be achieved by rotating the order in which the accounts are traded when implementing each new trading idea.

Portfolio construction

Managers of multiple portfolios must ensure that the trade ideas that result from their expertise and analysis are shared equitably among all managed portfolios. This is often easier said than done. Not every trade idea the manager generates is appropriate for all accounts under management, since individual clients typically have unique objectives, risk tolerances, benchmarks and other considerations. Even when the same idea can be applied to all accounts, the order in which the idea is implemented across the accounts may lead to different outcomes in individual portfolios as a result of market movements. A systematic, model-based approach that integrates an unbiased, rotating rebalancing schedule and a relatively non-discretionary portfolio construction process with appropriate checks and safeguards often provides the best platform for addressing such fairness concerns.

Outsourcing investment management operations

Investment managers rely increasingly on third-party providers to perform a variety of investment operations. The main advantage of outsourcing is cost effectiveness, since third-party providers develop and operate platforms to service multiple firms and thus create operational and technological efficiencies. Results of benchmarking studies, as reported by State Street in a study on outsourcing [25], show that outsourced operations are on average 9% more efficient than in-house operations, and that new arrangements achieve savings of 15–22%. Most of the middle-office and back-office operational functions shown in Figure 2 (which was adapted from State Street's article [25]), can be outsourced, freeing up managers to focus on their core competency, which is generating returns.

In addition to cost savings, outsourcing of investment operations offers the assurance of quality, since the third-party providers develop core competencies and expertise, and, out of competitive necessity, focus on providing superior service for the functions outsourced to them.

Another advantage of outsourcing is the independence of a third-party provider. This provides assurance to the investors that investment management and operational duties are segregated in critical functions such as NAV calculation and reporting. In light of recent investment scandals (for example, Madoff [4]), asset managers are finding it necessary to employ a reputable, independent firm to clear and price assets.

For any outsourcing arrangement to succeed, the investment manager must retain overall responsibility for any functions outsourced to third-party providers. The

Front office	**Asset management** – Sales and client – Relationship management – Investment research – Portfolio and risk management	**Trade execution** – Trade order manage ment and execution – Financial Information eXchange (FIX) connectivity	
Middle office	**Investment operations** – Transaction manage-ment – OTC derivatives processing – Data management – Cash administration	– Performance and analytics – Corporate actions processing – Portfolio recordkeep-ing and accounting	– Reconciliation processing – Client reporting – Billing – Client data warehouse
Back office	**Fund accounting** – General ledger – Security pricing – NAV calculation – Reconciliation – Daily, monthly, and ad-hoc reporting	**Global custody** – Assets safekeeping – Trade settlement – Cash availability – Failed trade reporting – Reconciliation – Income/tax reclaims	**Transfer agency** – Shareholder servicing

Fig. 2. Investment management process functions

investment manager must hold designated internal personnel accountable for outsourced activities, and a member of the senior management team, such as the Chief Operating Officer, should be charged with overseeing all outsourced operations. A pure outsourcing model, with only a skeletal in-house crew employed by the investment manager, must be avoided.

Managers that offer separately managed accounts (SMAs) need to consider the additional infrastructure, resources and effort needed to manage relationships with multiple external providers. They must also contend with the increased operational complexity required to effectively integrate their own service platforms with those of third-party providers such as custodians, prime brokers, fund administrators and ISDA counterparts, especially where clients control the selection of such providers.

Summary and conclusions

In this chapter, we present a best practices framework for operational infrastructure and controls in asset management organisations. Although our framework focuses on best practices with regard to hedge funds, we believe that more mature vehicles, such as mutual funds, could borrow from it as well.

Operational and control best practices are the means to address the objectives

of stakeholders in the asset management process. Their ultimate goal is to serve the interests of investors. Sophisticated investors should seek to determine whether their investment managers employ best practices in the key areas of (i) infrastructure and controls, (ii) valuation, and (iii) risk management. Managers may be interested in exploring outsourcing solutions for certain operational functions that enable them to benefit from the expertise and experience of third-party providers, while reducing costs and improving the quality of service offered to investors.

A manager that wishes to adopt best practices can access free and open industry resources, such as the Managed Funds Association's Sound Practices for Hedge Fund Managers [21], the Report of the Asset Managers' Committee to the President's Working Group on Financial Markets [6], The Alternative Investment Management Association's Guide to Sound Practices for European Hedge Fund Managers [1] and the CFA Institute's Asset Manager Code of Professional Conduct [10], among others.

As a final note, we offer a word of caution regarding 'check-the-box' approaches to operational and control activities. It is straightforward to obtain information about best practices (anyone with an internet connection may do so), but it can be challenging to put them into practice effectively. Successful implementation of best practices across an asset management organisation is often a function of experience, investment and strong governance. Managers that seek to introduce best practices in their organisations should first ascertain that they have a sound, principle-based governance structure in place before they embark on such an initiative. This will help ensure that appropriate parties are held accountable for critical activities and processes, and that communication between essential functions across the firm proceeds smoothly.

Acknowledgements

We extend our sincere thanks to Jeff Byrne, Suzanne Escousse, Olaniyi Mabogunje, David May, Keri Minichiello, Michael Pinedo, Andrea Raphael and especially Jay Reingold for reviewing this chapter and providing insightful comments that greatly improved its content and readability. We would also like to thank Priscilla Eng for greatly enhancing the appearance of the two figures in the chapter.

References

[1] Alternative Investment Management Association (2007), 'Guide to Sound Practices for European Hedge Fund Managers', May. (Retrieved from http://www.aima.org/en/knowledge_centre/sound-practices/guides-to-sound-practices.cfm on 3 August 2009).

[2] Alternative Investment Management Association (2007), 'Guide to Sound Practices for Hedge Fund Valuation', March. (Retrieved from http://www.aima.org/en/knowledge_centre/sound-practices/guides-to-sound-practices.cfm on 3 August 2009).

[3] Anson, M. J. P. (2001), "Hedge Fund Incentive Fees and the 'Free Option'", *Journal of Alternative Investments,* vol. 4, no. 2, pp. 43–48, Fall.

[4] Arvedlund, E. (2009), 'Too good to be true: the rise and fall of Bernie Madoff', Portfolio Hardcover, Penguin Publishing, New York, 11 August.

[5] Asness, C. (2006), 'The Future Role of Hedge Funds', *CFA Institute Conference Proceedings Quarterly,* vol. 23, no. 2, pp. 1–9, June.

[6] Asset Managers' Committee to the President's Working Group on Financial Markets (2009), 'Best Practices for the Hedge Fund Industry: Report of the Asset Managers' Committee to the President's Working Group on Financial Markets', 15 January. (Retrieved from http://www.amaicmte.org/Public/AMC%20Report%20-%20Final.pdf on 3 August 2009).

[7] Black, K. (2007), 'Preventing and Detecting Hedge Fund Failure Risk through Partial Transparency', *Derivatives Use, Trading & Regulation,* vol. 12, no. 4, pp. 330–341, February.

[8] Brown, S.J., W.N. Goetzmann, B. Liang and C. Schwartz (2009), 'Estimating Operational Risk for Hedge Funds: The ω-Score', *Financial Analysts Journal,* vol. 65, no. 1, pp. 43–53, January/February.

[9] Brown, S.J., W.N. Goetzmann, B. Liang and C. Schwartz (2009a), 'Trust and Delegation', Working paper, first draft: June 16 (Retrieved from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1456414 on October 15, 2009).

[10] CFA Institute (2009), 'Asset Manager Code of Professional Conduct', Second Edition. (Retrieved from http://www.cfapubs.org/doi/pdf/10.2469/ccb.v2009.n8.1 on 3 August 2009).

[11] CFA Institute (2005) 'Code of Ethics and Standards of Professional Conduct'. (Retrieved from https://www.cfainstitute.org/centre/codes/ethics/index.html on 3 August 2009).

[12] CFA Institute (2005a) 'Standards of Practice Handbook', Ninth Edition. (Retrieved from http://www.cfapubs.org/doi/pdf/10.2469/ccb.v2005.n3.4000 on 3 August 2009).

[13] CFA Institute (2004) 'Soft Dollar Standards: Guidance for Ethical Practices Involving Client Brokerage'. (Retrieved from http://www.cfapubs.org/doi/abs/10.2469/ccb.v2004.n1.4005 on 3 August 2009).

[14] CFA Institute Centre (2009) 'About Investment Management: Governance'. (Retrieved from https://www.cfainstitute.org/centre/topics/im/governance.html on 17 August 2009).

[15] Department of the Treasury (2002), 'Treasury Department Issues USA PATRIOT Act Guidance on Section 352', 25 October. (Retrieved from http://www.treas.gov/press/releases/po3580.htm on 22 August 2009).

[16] Federal Register (1998), 'Cross-Trades of Securities by Investment Managers', vol. 63, no. 54, page 20. (Retrieved from http://www.dol.gov/ebsa/regs/fedreg/notices/98007271.pdf on 27 August 2009).

[17] Financial Accounting Standards Board (2006), *Statement of Financial Accounting Standards,* no. 157 on Fair Value Measurements with amendments, September. (Retrieved from www.fasb.org on 21 August 2009).

[18] Investment Company Institute (2009), '2009 Investment Company Fact Book', 49th Edition, (Retrieved from http://www.ici.org/pdf/2009 fact book.pdf on 14 August 2009).

[19] Kundro, C. and S. Feffer (2004), 'Valuation Issues and Operational Risk in Hedge Funds', Capco Institute, Working paper, March. (Retrieved from http://www.capco.com/files/pdf/74/02_RISKS/04_Valuation%20issues%20and%20operational%20risk%20in%20hedge%20funds.pdf on 31 August 2009).

[20] Kundro, C. and S. Feffer (2003), 'Understanding and Mitigating Operational Risk in Hedge Fund Investments', Capco Institute, White paper series, March. (Retrieved from http://www.capco.com/content/knowledge-ideas?q=content/research on 31 August 2009).

[21] Managed Funds Association (2009), 'Sound Practices for Hedge Fund Managers',. (Retrieved from http://www.managedfunds.org/files/pdf's/MFA_Sound_Practices_2009.pdf on 3 August 2009).

[22] O'Hara, N.A. (2009), 'Asleep at the Switch? Corporate boards' culpability in the 2008 financial crisis', *The Investment Professional,* vol. 2, no. 3, pp. 60–65, Summer.

[23] Securities and Exchange Commission (1998), 'Section 28(e) of the Exchange Act: Inspection Report on the Soft Dollar Practices of Broker-Dealers, Investment Advisers and Mutual Funds', September 22. (Retrieved from http://www.sec.gov/news/studies/softdolr.htm on 22 August 2009).

[24] Smith, R. (2007), 'Merrill's $5 billion bath bares deeper divide', *The Wall Street Journal,* 6 October.

[25] State Street (2009), 'Outsourcing Investment Operations: Managing Expense and Supporting Strategic Growth', *State Street Vision Series,* May. (Retrieved from http://www.statestreet.com/knowledge/vision/2009/2009_oio.pdf on 22 August 2009).

[26] Stulz, R. (2007), 'Hedge Funds: Past, Present, and Future', *Journal of Economic Perspectives*, vol. 21, no. 2, pp. 175–194, Spring.