


A person wearing a red racing suit and a red helmet is kneeling on a dark surface, using a pneumatic tool to work on a large, black, treaded tire. The tire is part of a yellow race car with red and black stripes. Another person in a red suit is standing nearby, partially visible. The scene is brightly lit, suggesting an indoor or well-lit outdoor environment.

# Navigating Risk in the High-Frequency Trading Environment

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PRICEWATERHOUSECOOPERS 

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# Section 1—Point of view

## Point of view

Due to the significant impact of high-frequency trading on global markets, this practice has attracted widespread public attention and increased regulatory scrutiny.

**High-frequency trading is one of the most significant market developments in recent years.**

High-frequency trading (HFT) is estimated to account for 40 to 60 percent of average daily volume in the US equity markets.<sup>1</sup> By any measure, HFT has become a mainstay of financial markets.

Advocates of HFT claim that it has lowered trading costs, boosted liquidity, and increased volume and price discovery. Given the automated nature of the current trading environment, the role of human market makers and specialists has been reduced while the impact of HFT on market liquidity has increased dramatically.

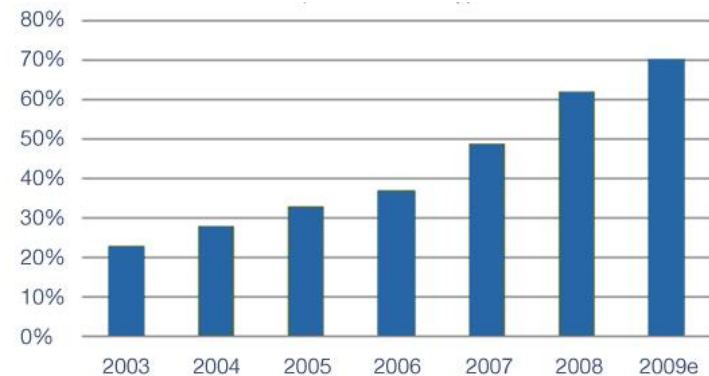
By one estimate, in 2008, profits associated with HFT were between \$8 billion and \$21 billion.<sup>2</sup>

**Many market observers are concerned that inadequate trade execution controls could lead to systematic market disruptions if algorithms induce other trading systems to react and exacerbate trading errors.**

There is widespread and growing debate over the practice of HFT, though much of this criticism is not new. However, after the brief 1,000-point drop in the US stock market on May 6, 2010, the growing role of high-frequency traders in the nation's financial markets is drawing new scrutiny.<sup>3</sup>

Some experts warn that computer-based trading may contribute to increased volatility in the markets. According to a recent article in *The New York Times*, increasing complexity, the speed of computer trading systems, and the lack of consistent rules among exchanges may contribute to this volatility.<sup>4</sup>

**High-frequency Trading  
(Percent of Average Daily Trade Volume)**



Source: New World Order: The High Frequency Trading Community and Its Impact on Market Structure. Aite Group. Available from: <http://www.aitegroup.com/reports/200902251.php>

<sup>1</sup> Source: <http://www.sec.gov/news/testimony/2010/ts051110mls.htm> and "Demystifying and Evaluating High Frequency Equities Trading." Celent, December 2009.

<sup>2</sup> Source: "The Impact of High-frequency Trading: Manipulation, Distortion or a Better-functioning Market?" September 30, 2009. <http://knowledge.wharton.upenn.edu/article.cfm?articleid=2345>

<sup>3</sup> Source: "Speedy New Titans of Trading Make Waves Far From Wall St." *The New York Times*, May 17, 2010.

<sup>4</sup> Source: "Wall St. Plunge Suggests Flaws In Fast Trading." *The New York Times*, May 10, 2010.

## Point of view

There is no universally accepted definition of high-frequency trading.

### **Certain characteristics are common to all high-frequency trading.**

High-frequency trading (HFT) is characterized by a high number of orders and transactions, and a low average profit per trade. Typical position holding periods for HFT strategies range from a few seconds to a few hours. In most cases, positions are not held overnight.

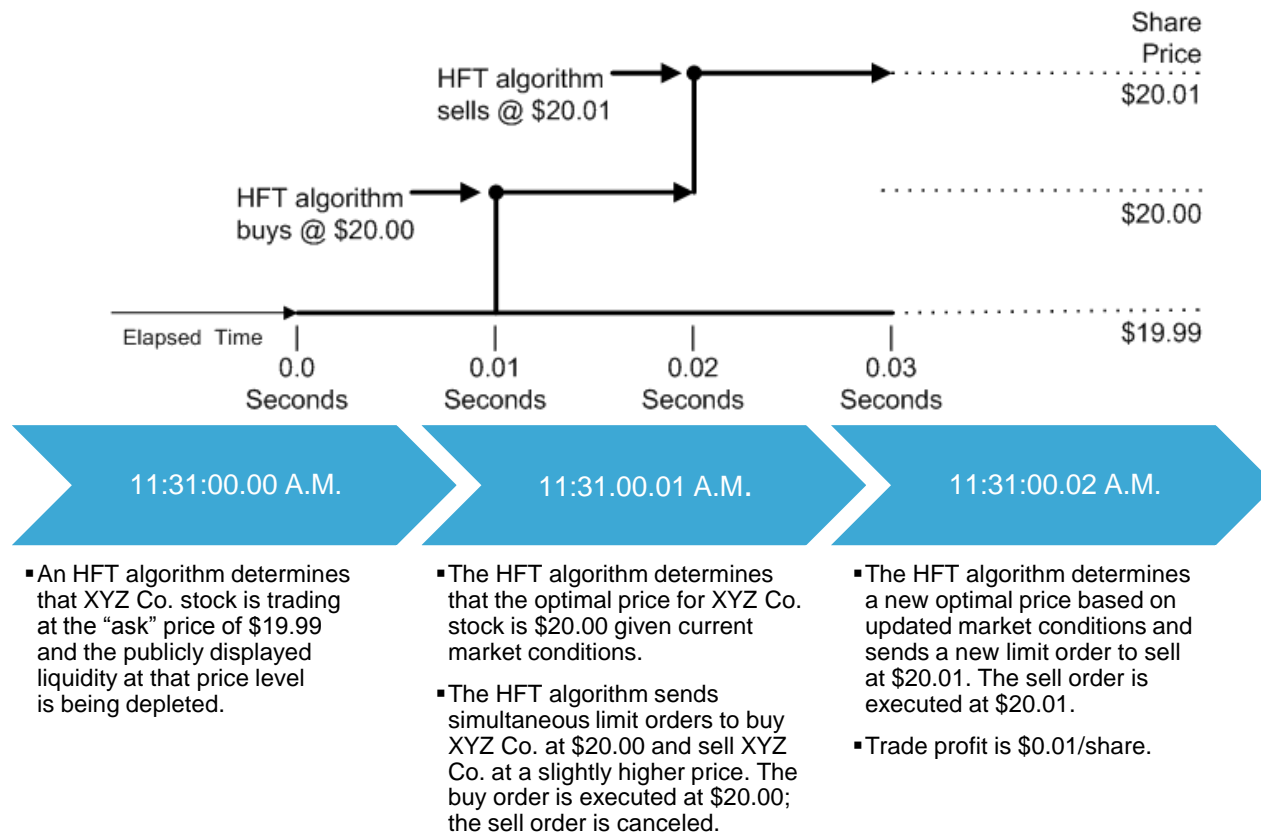
Identifying and capitalizing on temporary market inefficiencies, HFT relies on highly sophisticated technology infrastructures and massive amounts of intra-day market data. Reduced latency via server co-location, unfiltered access, and transmission size optimization are critical to HFT. The precision and speed required to implement HFT strategies can be accomplished only through computer automation, with human involvement typically limited to oversight and monitoring.

Although HFT can be applied to any sufficiently liquid electronically-traded financial instrument, most active HFT strategies currently operate in equity, foreign exchange, and derivatives markets. Most of these strategies fit into one of the following generalized categories: automated market making, order flow recognition, macroeconomic event, or deviation arbitrage.

## Point of view

### An example of a transaction sequence within a high-frequency, momentum-based strategy

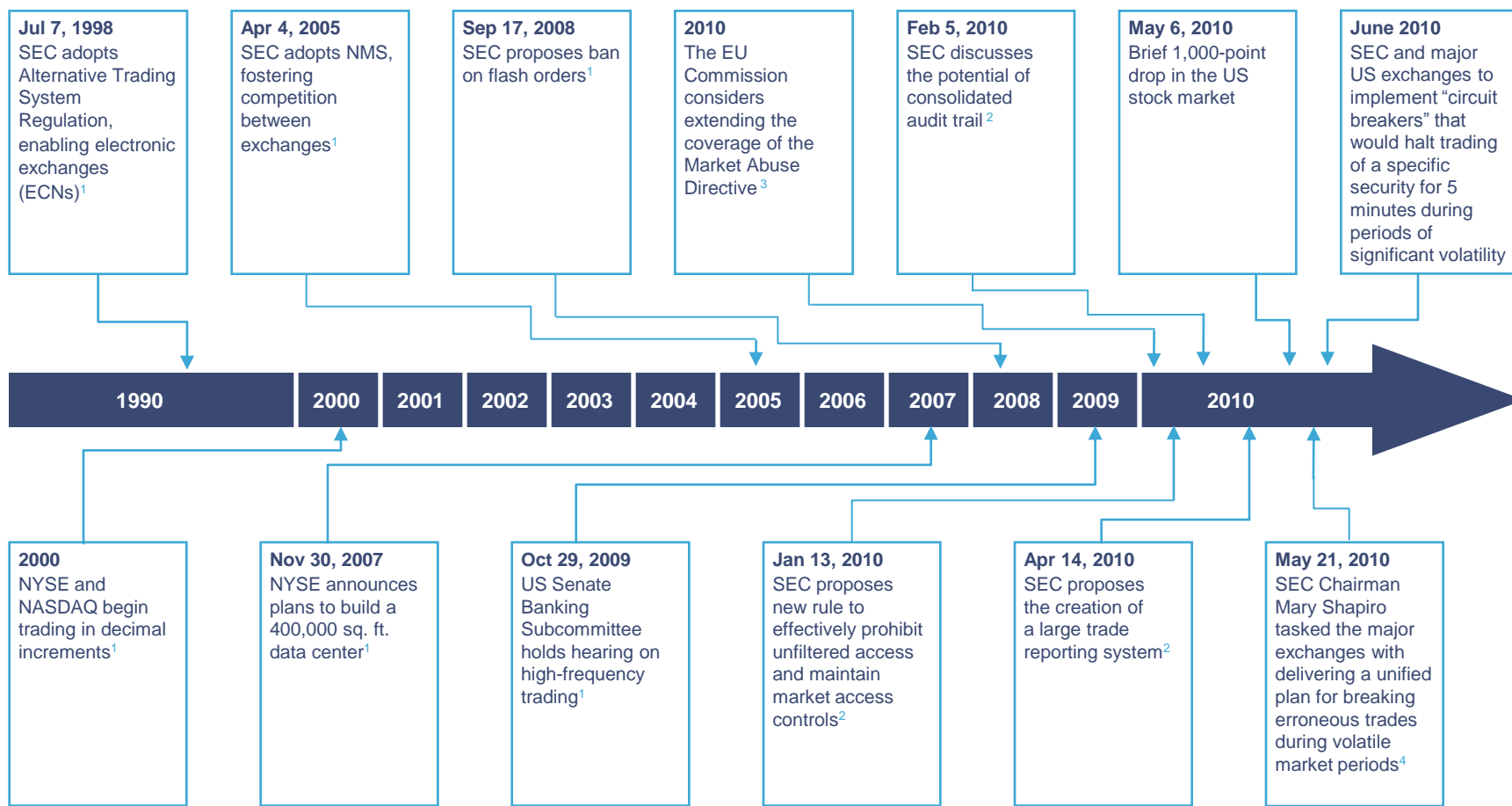
High-frequency trading strategies use computers to evaluate market information and send orders to buy and sell securities at optimal prices. The objectives of high-frequency trading strategies and the types of data used to make trading decisions can vary widely. Depicted below is an example of a high-frequency momentum-based strategy.





## Point of view

Market structure development and technological advances have allowed high-frequency trading to evolve from its infancy into a mainstay of financial markets in less than two decades.



<sup>1</sup> Source: "A brief history of computer-generated trading." <http://hft.thomsonreuters.com/2009/11/20/a-brief-history-of-computer-generated-trading/>

<sup>2</sup> Source: <http://www.sec.gov/>

<sup>3</sup> Source: "High-Frequency Trading Faces EU Market Abuse Probe." <http://www.businessweek.com/news/2010-04-30/high-frequency-trading-faces-eu-market-abuse-probe-update1-.html>

<sup>4</sup> Source: "SEC scrutinizes market professionals." The Wall Street Journal Europe, May 21, 2010.

## Point of view

To keep pace with advances in high-frequency trading, regulatory investigations are becoming more sophisticated.

**Regulators acknowledge the importance of matching the skills of their professionals with those of the high-frequency trading community.**

Chairman Mary Schapiro has noted that “the technologies used for market oversight and surveillance have not kept pace with the technology and trading patterns of the rapidly evolving and expanding securities markets.”<sup>1</sup> In response to this concern and the growth in high-frequency trading, regulators are expanding their skill sets by hiring industry professionals with expertise in quantitative trading strategies and analytics. Inspection teams will have these quantitative resources at their disposal, enabling them to identify manipulative or problematic trading behaviors by analyzing large volumes of trading activity. Regulators may also consider hiring expert consultants to assist with inspections and examinations, further increasing the technical nature of inspections.

It is critical that quantitatively driven market participants develop sophisticated compliance programs and maintain strong risk and control environments to meet the increasing expectations of regulators and stakeholders. To ensure that their risk management, compliance, and control programs are appropriately designed, these market participants should act now to prepare fully for future regulation. By doing so, they should be better positioned to avoid disruption to their businesses.

<sup>1</sup> Source: “Testimony Concerning the Severe Market Disruption on May 6, 2010.” <http://www.sec.gov/news/testimony/2010/ts051110mls.htm>



## Point of view

Quantitatively driven market participants should develop strategies to meet the increasing expectations of regulators and stakeholders.

The following are three key areas that market participants should consider when managing their environment:



## Point of view

Quantitatively driven market participants should assess their operations, processes, and procedures to ensure that they have a sound control environment and governance structure.

### Key considerations

**Expertise of in-house compliance, risk management, and control functions**

### Evolving environment

- Regulators are concerned that due to the complex, highly specialized nature of high-frequency trading (HFT), many compliance, risk management, and other control functions do not possess the relevant background and sufficient training to independently assess these strategies and the related risks.

### Managing the evolving environment

- Firms that engage in sophisticated quantitative strategies should employ adequately trained and seasoned compliance, risk, and control personnel.

**Adequacy of pre-trade controls**

- The SEC has proposed a rule to require specific controls around sponsored access. This proposal stems from the concern that sponsored access arrangements do not currently require sufficient controls on the part of the sponsoring broker-dealer with respect to compliance, risk management oversight, or trade execution.

- Firms should design, implement, document, and test preventative and detective pre-trade controls. When appropriately tailored to the strategy of the firm, such controls can significantly reduce the need to perform extensive trade surveillance.

**Effectiveness of trade surveillance**

- To facilitate increased oversight, the SEC has proposed a large trader reporting rule that would require firms representing a significant portion of trading volume to identify their trading activity.
- The SEC has been directed to focus on understanding HFT strategies and “must continue to make reducing systematic and operational risk a top regulatory priority.”<sup>1</sup>

- Traditional trade surveillance logic is no longer sufficient to identify potentially problematic activity. Market participants should determine the key risks that surveillance reports should monitor. These risks will vary depending on the firm’s trading strategies.

<sup>1</sup> Source: Senator Ted Kaufman. “Kaufman Cites Rising Concern over high-frequency trading Among Regulatory Agencies, Market Participants.” [http://kaufman.senate.gov/press/press\\_releases/release/?id=a31a2a0d-8b5f-4c5d-a265-5f4bedbac5fc](http://kaufman.senate.gov/press/press_releases/release/?id=a31a2a0d-8b5f-4c5d-a265-5f4bedbac5fc)

## Section 2—A framework for action

## A framework for action

Quantitatively driven market participants face a growing number of challenges. It is critical that they employ appropriate tools to address these risk and control challenges.



# A framework for action

## Risk and compliance control challenges

Challenge	Action items/considerations	Sample of detailed action steps
<b>Trade conduct and monitoring:</b> Firms are unsure of the types of trading conduct that they should be monitoring and how to do it	<ul style="list-style-type: none"> <li>▪ Develop an approach to helping the firm identify the types of trading conduct it should be monitoring and how to do it</li> </ul>	<ul style="list-style-type: none"> <li>▪ Develop an understanding of how certain securities laws and related rules should be interpreted relative to high-frequency trading</li> <li>▪ Perform an assessment to determine which types of potential market manipulation monitoring should be developed</li> <li>▪ Determine whether the firm's organizational structure and/or control environment warrant additional monitoring procedures</li> <li>▪ Determine the appropriate parameters for monitoring reports</li> </ul>
<b>Data adequacy:</b> Firms believe that they do not have access to sufficient information to adequately monitor trading activity	<ul style="list-style-type: none"> <li>▪ Assess the data necessary to adequately monitor trading activity and determine how to obtain this data</li> </ul>	<ul style="list-style-type: none"> <li>▪ Evaluate the data available to determine the most effective monitoring methodologies, and perform a gap analysis to determine the additional information necessary</li> <li>▪ Perform an assessment to determine whether the firm should monitor for wash sales and principal trades when executing across multiple venues</li> <li>▪ Keep in mind that high-frequency trading activity is differentiated by microseconds and that execution venue timestamps may not be perfectly synchronized</li> </ul>

## A framework for action

### Risk and compliance control challenges (continued)

Challenge	Action items/considerations	Sample of detailed action steps
<b>Evaluation of trade surveillance reports:</b> <b>Firms are struggling with how to evaluate the output of trade surveillance reports</b>	<ul style="list-style-type: none"> <li>▪ Establish a methodology to consistently and accurately evaluate the output of trade surveillance reports</li> </ul>	<ul style="list-style-type: none"> <li>▪ Create trade surveillance reports that present actionable information in trading environments with large trade volumes</li> <li>▪ Assess the appropriateness of involving front-office personnel in the interpretation of trade surveillance reports</li> <li>▪ Develop a strategy to differentiate false positives from alerts requiring further investigation</li> <li>▪ Ensure that compliance, risk, and control personnel are adequately trained and can effectively monitor the risks associated with these activities, and understand the impact of these strategies on the market</li> <li>▪ Establish triggers with middle office operations to alert risk, compliance or control personnel of significant, higher than normal volume or unusual trading activity or errors</li> </ul>
<b>Design of pre-trade controls:</b> <b>Firms are unsure of the nature of preventative pre-trade controls that should be implemented</b>	<ul style="list-style-type: none"> <li>▪ Design pre-trade controls that are tailored to the firm's trading strategy and related risks</li> </ul>	<ul style="list-style-type: none"> <li>▪ Verify that the responsibility to implement pre-trade controls resides with personnel that are independent of trading functions</li> <li>▪ Establish systems to ensure that potentially erroneous orders are blocked before being released for execution</li> <li>▪ Perform tests to determine that pre-trade controls function properly and provide notification when errors are detected</li> <li>▪ Ensure that controls have been documented. Regulatory inspection and examination teams will rely heavily on documentation that the firm maintains to demonstrate its control activities</li> </ul>

## A framework for action

### Risk and compliance control challenges (continued)

Challenge	Action items/considerations	Sample of detailed action steps
<b>Management of trade surveillance reporting:</b> <b>Firms are wary of developing trade surveillance reports that they are unable to manage adequately</b>	<ul style="list-style-type: none"> <li>▪ Develop trade surveillance reporting that is tailored to the firm's trading strategy and related risks</li> </ul>	<ul style="list-style-type: none"> <li>▪ Determine that trade surveillance reports developed are appropriate for the firm's trading activity</li> <li>▪ Examine the output of trade surveillance reports to ensure that the reports are not generating so many false positives that the firm cannot keep up with the volume of alerts</li> <li>▪ Determine the type of follow-up that should be performed and implement follow-up actions to ensure that potential issues are addressed appropriately</li> </ul>
<b>Segregation of proprietary and client strategies:</b> <b>Firms are unsure of the degree to which proprietary and client strategies should be segregated</b>	<ul style="list-style-type: none"> <li>▪ Assess the current and required levels of segregation, and tailor the nature and extent of barriers to the trading strategy and risk of the firm</li> </ul>	<ul style="list-style-type: none"> <li>▪ Perform an assessment to determine to what degree researchers, technological assets, and data should be segregated</li> <li>▪ Determine to what extent information barriers can be implemented without impairing the collaborative culture of the quantitatively driven firm</li> <li>▪ Perform an assessment to determine what can be shared between proprietary strategies and client strategies, and assess the implications of sharing strategies</li> <li>▪ Determine how to structure senior management oversight in environments with information barriers</li> </ul>



## A framework for action

### Risk and compliance control challenges (continued)

Challenge	Action items/considerations	Sample of detailed action steps
<b>Effectiveness of information barriers:</b> <b>Firms are unsure of how to objectively demonstrate that information barriers are effective</b>	<ul style="list-style-type: none"> <li>Establish key performance indicators for segregation and trade surveillance monitoring</li> </ul>	<ul style="list-style-type: none"> <li>Develop a method to effectively report instances where firm strategies are not coordinated when trade surveillance reports give the appearance that the strategies may be correlated</li> <li>Establish preventive and detective controls to test and enforce the effectiveness of information barriers</li> </ul>
<b>Conflict-of-interest management:</b> <b>Conflicts of interest posed by the side-by-side management of proprietary and client capital may require organizational changes, enhanced disclosures, and additional monitoring</b>	<ul style="list-style-type: none"> <li>Perform a comprehensive review of conflicts of interest, and tailor the solution to the trading strategy and risks of the firm</li> </ul>	<ul style="list-style-type: none"> <li>Determine under what circumstances it is appropriate for certain employees to have dual roles (e.g., having responsibilities for proprietary and client capital)</li> <li>Evaluate investor disclosures to determine if further review is advisable</li> <li>Ensure that compliance, risk, and control functions have sufficient internal influence and are independent of the trading function so that concerns or risks are addressed properly</li> </ul>
<b>Risk identification, assessment, and response:</b> <b>Firms are unsure if their risk controls, including monitoring, adequately address all the components of quantitative and high-frequency trading</b>	<ul style="list-style-type: none"> <li>Build an enterprise-wide framework for identification and management of financial, business, and operational risks</li> </ul>	<ul style="list-style-type: none"> <li>Perform an assessment of risk management function and framework</li> <li>Catalog risk components and relevant controls</li> <li>Develop testing programs</li> <li>Develop and implement risk management technology solutions</li> </ul>

## Section 3—How PwC can help

# How PwC can help

## Core competencies

### Risk management

- Assess/benchmark risk management function and framework
- Build an enterprise-wide framework for identification and management of financial, business, and operational risks
- Develop testing programs
- Assist with development and implementation of risk management technology solutions

### Regulatory compliance

- Assist clients in issuing fully accurate and timely regulatory reports, including newly-required reports
- Help clients ensure that they are making full and accurate disclosures to all relevant investors/clients
- Evaluate, design, and implement compliance programs
- Perform mock regulatory compliance exams
- Perform attest reports on the effectiveness of compliance control objectives
- Advise and help develop and/or deliver effective compliance training programs
- Evaluate risk and compliance resources
- Assist with cost reduction of existing compliance program

### Internal controls/internal audit

- Perform internal control exams and readiness assessments
- Assist with Sarbanes-Oxley readiness and ongoing compliance
- Assist companies in establishing and/or running an internal audit function
- Provide consulting services that address the key concerns of internal auditors

### Governance/board communications

- Assist with identifying external benchmarking data and key performance indicators
- Evaluate the governance structure and framework for regulatory and compliance
- Help clients develop adequate controls to ensure that all investments and holdings are consistent with disclosures made to clients and applicable restrictions
- Help clients develop adequate controls to seek best execution, and to prevent and detect trading violations involving short selling, offerings, and manipulation
- Evaluate effectiveness of controls

### Forensics and investigations

- Perform forensic investigations
- Provide expert testimony
- Evaluate existing fraud prevention programs

## How PwC can help

PwC is distinguished by the depth and breadth of its professionals.

### Experience

Our teams have significant experience in performing comprehensive evaluations of risk and compliance programs for several high-profile hedge funds that manage high-frequency trading (HFT) strategies. Throughout these evaluations, areas of focus have included:

- The key regulatory, operational, financial, and strategic risks posed by various HFT strategies, including proprietary strategies
- Guidance on when to enhance the control environment
- Guidance on appropriate business structures and controls that should be implemented to mitigate the potential conflicts of interest related to side-by-side management of client and proprietary capital
- Reviewing compliance surveillance programs to determine whether key regulatory risks are being addressed; determining whether the logic supporting compliance reports is sufficient to identify risks intended to be monitored; then providing specific recommendations about the types of compliance surveillance reports that should be developed and the principles that should be considered during their development
- Using forensics tests to analyze data and spot unusual, unexpected, or problematic trends in transactions or other information produced; unintentional errors or violations; exceptions indicative of internal control deficiencies, or even fraud

### Expertise

PricewaterhouseCoopers can help address regulatory compliance issues and manage regulatory risk effectively. Our asset management regulatory team, a part of the firm's national Financial Services Regulatory practice, is comprised of experienced professionals with diverse backgrounds in the asset management industry. Our team includes:

- Former director and an associate director of the SEC's Office of Compliance Inspections and Examinations
- Former associate director of the New York office of the SEC
- Former senior trading specialist
- Former SEC examiners and branch chiefs
- Former chief compliance officers
- Former chief risk officers
- Forensics and investigations experts
- Technology, data, and systems specialists
- Governance, risk, and compliance system providers with which PwC has partnered to offer compliance and control automation

PricewaterhouseCoopers helps market participants to meet the challenges presented by this new reality.

## How PwC can help

For further information, please contact:

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## Section 4—Select qualifications

## Select qualifications

### A hedge fund considering expansion of high-frequency trading strategies through a proprietary trading vehicle—evaluation of regulatory concerns

<b>Issues</b>	<p>The client was considering developing a proprietary trading vehicle to deploy high-frequency trading strategies. The client asked PwC to conduct a thorough evaluation of the regulatory concerns posed by its planned business expansion and to provide guidance on the management structure and internal controls needed to mitigate potential conflicts of interest related to side-by-side management of client and proprietary capital.</p>
<b>Approach</b>	<p>In the first phase of the project, the PwC engagement team evaluated critical documents, including investor disclosures, regulatory filings, marketing materials, detailed strategy descriptions, and organizational charts. Key achievements in the first phase included:</p> <ul style="list-style-type: none"><li>▪ Identifying critical risk areas related to the client's organization, management, and anticipated trading strategies</li><li>▪ Developing detailed interview questionnaires to facilitate efficient and targeted meetings with portfolio management teams</li></ul> <p>In phase two, the engagement team interviewed key personnel involved with the management and oversight of the anticipated proprietary trading strategies. Key achievements during this phase included:</p> <ul style="list-style-type: none"><li>▪ Assessing the regulatory risks related to the proposed trading strategies and educating the portfolio management teams about the implications</li><li>▪ Refining the list of critical regulatory risk areas identified in phase one, based on strategy-specific information discussed during meetings with portfolio management teams</li><li>▪ Soliciting feedback from the portfolio management teams to identify constraints that may prevent certain mitigation measures from being effective or implementable</li></ul> <p>After meeting with portfolio management teams and working with the firm's compliance department, PwC delivered a set of recommended analyses and procedures that the client should undertake to inform senior management's decision of whether to pursue the proprietary strategies. The deliverables also highlighted the business structure and internal controls that would help to mitigate the regulatory risks if the strategies were to be implemented.</p>
<b>Benefits</b>	<p>As a result of our work, the client's senior management, compliance department, and portfolio management teams were provided with a realistic regulatory perspective, enabling better decision making in a high-risk regulatory environment. The client also received recommendations to improve the governance and controls related to side-by-side management of client and proprietary capital.</p>



## Select qualifications

### An industry-leading high-frequency trading hedge fund—guidance on business structures and controls to mitigate potential conflicts of interest

<b>Issues</b>	<p>As a registered investment adviser, the client managed several vehicles for outside investors as well as vehicles composed of proprietary capital. The organization's shared research environment, technology infrastructure, and personnel supported management of both client and proprietary capital. The client sought guidance on business structures and controls that should be implemented to mitigate potential conflicts of interest related to side-by-side management of client and proprietary capital.</p>
<b>Approach</b>	<ul style="list-style-type: none"><li>▪ After reviewing the client's key documents, including investor disclosures, regulatory filings, marketing materials, detailed strategy descriptions, and organizational charts, the PwC engagement team preliminarily identified areas of risk to the firm.</li><li>▪ The engagement team conducted thorough interviews with key personnel involved in the management and oversight of the trading strategies, including senior management, portfolio managers, quantitative researchers, execution desk traders, compliance personnel, risk managers, and others. As part of the interview sessions, the engagement team discussed with the client personnel the key regulatory risks facing the firm and the importance of each person's role in mitigating the risks.</li><li>▪ The engagement team reviewed the client's compliance surveillance program to determine whether key regulatory risks were being addressed and whether the logic underlying the reports was sufficient to identify risks that should be monitored.</li><li>▪ The client deliverable included specific recommendations to improve the control and governance related to the entire investment management process, including specific recommendations on the types of compliance surveillance reports that should be developed as well as the principles that should be considered when developing reports. In order to facilitate management's understanding, the recommendations were presented in a way that linked control objectives with key areas of regulatory risk.</li></ul>
<b>Benefits</b>	<p>As a result of our work, the client adopted significant changes to its business model. The changes enhanced management's governance and strengthened the control environment to help mitigate risks related to side-by-side management of client and proprietary capital.</p>

## Select qualifications

### A high-profile multi-strategy hedge fund managing a high-frequency trading strategy deployed using proprietary capital—guidance on controls and compliance

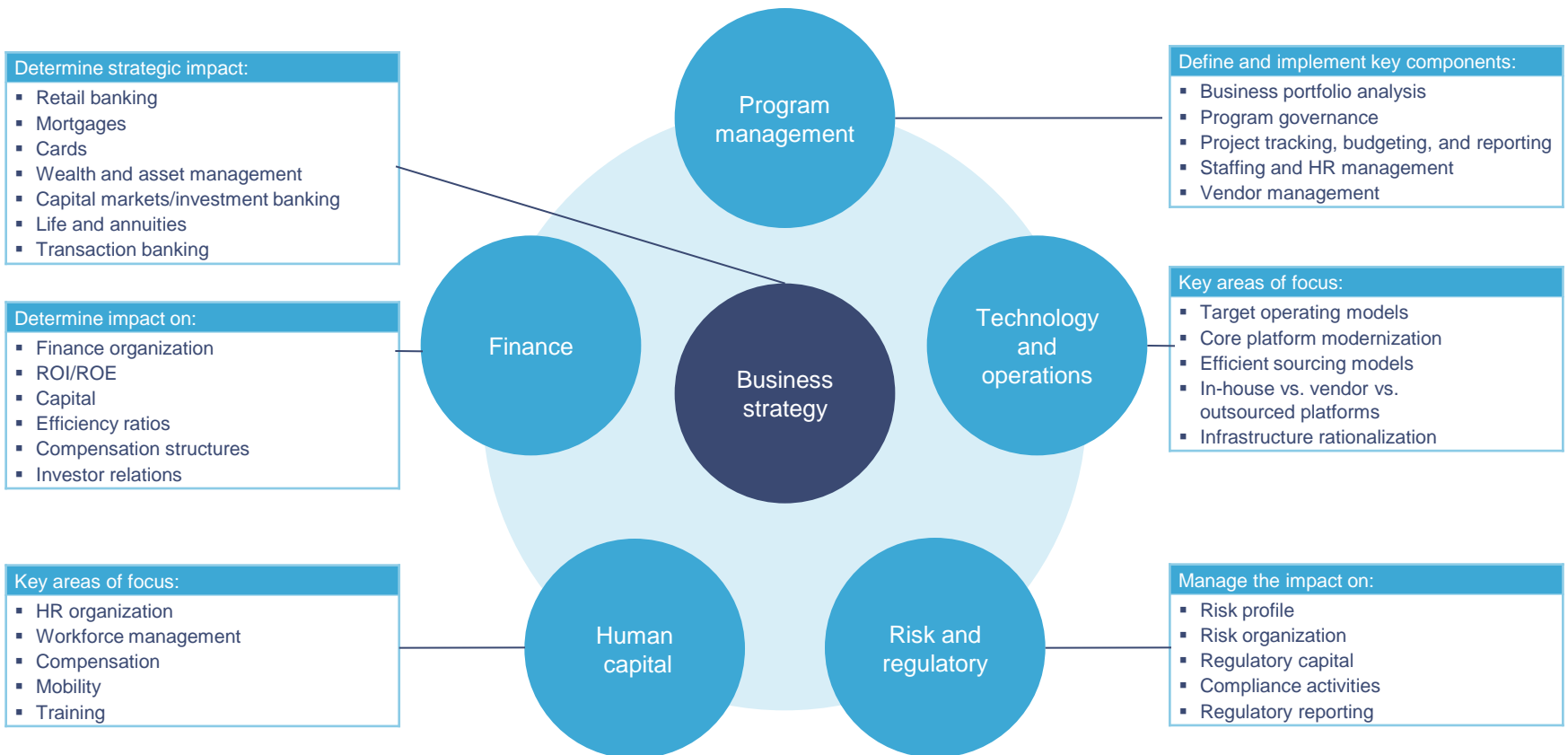
<b>Issues</b>	<p>The client hired PwC to perform a comprehensive evaluation of its compliance program prior to registering with the SEC as an investment adviser. The PwC team was informed that the client had recently launched a high-frequency trading (HFT) strategy that managed the capital of the firm's founder. The chief compliance officer (CCO) asked PwC to focus on the risks presented by the proprietary HFT strategy and provide guidance on enhancing the control environment and compliance surveillance program.</p>
<b>Approach</b>	<ul style="list-style-type: none"><li>▪ The core PwC engagement team met with PwC's quantitative asset management regulatory team to understand the client's organizational structure, trading strategies, and management and control environment.</li><li>▪ PwC met with the CCO, the managing director overseeing the HFT strategy, and other key oversight personnel. The objective of the meeting was to understand the trading strategy, the current risk mitigation measures, and the responsibilities of the portfolio management team.</li><li>▪ PwC met with the portfolio manager to understand his team's investment management process and the investment strategies he oversaw. During all meetings, PwC advised the client on potential risks that would be the focus of regulators, given the client's organizational structure and businesses.</li><li>▪ As part of the client deliverable, PwC included recommendations related to enhancing the control environment and compliance surveillance program targeted to the HFT strategy.</li></ul>
<b>Benefits</b>	<p>PwC advised management about the key regulatory risks presented by its organizational structure and proprietary HFT strategy and provided recommendations tailored to address the unique risks presented by the strategy.</p>

# Appendix—More about PwC

## More about PwC

### Our market-tested approach

PwC's financial services practice has a specialized cross-functional group to assist our clients with the legislative, regulatory, operational, and market issues they face.



# More about PwC

## Client needs and issues

We look across the entire organization—focusing on strategy, structure, people, process, and technology—to help our clients improve business processes, transform organizations, and implement technologies needed to run the business.

Client needs	Issues we help clients address
Manage risk, regulation, and financial reporting	<ul style="list-style-type: none"><li>▪ Building a risk-resilient organization</li><li>▪ Managing ERP investment and project execution risk</li><li>▪ Safeguarding the currency of business; keeping sensitive data out of the wrong hands</li><li>▪ Affirming capital project governance and accountability</li><li>▪ Assessing and mitigating corruption risk in your global business operations</li><li>▪ Accounting and financial reporting</li><li>▪ Third-party assurance</li><li>▪ Taxation</li></ul>
Build effective organizations	<ul style="list-style-type: none"><li>▪ Rethinking strategy in terms of markets, geographies, channels, and clients</li><li>▪ Restructuring organizational models in terms of structures, policies, roles</li><li>▪ Establishing effective strategic sourcing and procurement</li><li>▪ Realizing competitive advantage through effective sales operations inventory planning</li><li>▪ Transforming the close and consolidation process to work for rather than against you</li></ul>
Reduce costs	<ul style="list-style-type: none"><li>▪ Driving efficiency through shared services</li><li>▪ Redesigning finance to realize efficiency and competitive advantage</li><li>▪ Taking control of cost through effective spend management and cash forecasting practices</li><li>▪ Driving sustainable cost reduction</li></ul>
Leverage talent	<ul style="list-style-type: none"><li>▪ Defining and implementing an effective HR organization</li><li>▪ Rethinking pivotal talent</li></ul>
Innovate and grow profitably	<ul style="list-style-type: none"><li>▪ Reshaping the IT function into a source of innovation</li><li>▪ Transforming business information to drive insight and fact-based decision making</li><li>▪ Evaluating acquisition and divestiture strategies to position for the future</li><li>▪ Realizing deal synergy and value</li><li>▪ Developing sustainability programs that add value</li></ul>



## More about PwC

### Our Financial Services practice

#### Multi-disciplinary approach

PwC stands alone in its ability to assemble and successfully manage multi-disciplinary teams of program managers with deep skills in strategy, technology, operations, human capital, risk, finance, accounting, tax, and regulation. In the United States alone, we are able to call upon our 800-person Financial Services Advisory practice and over 3,000 financial services professionals. With our 2009 acquisition of BearingPoint's financial services consulting businesses in the United States and Japan, as well as its Chinese and Indian Global Development Centers, PwC is now a global market leader in all relevant aspects of business consulting.

#### Accountability and cost effectiveness

Our comprehensive approach to serving our clients provides them with a single point of accountability, which creates an efficient and effective day-to-day working arrangement and, most importantly, best positions our clients for success. We have significant experience in helping to drive complex programs and feel strongly that we can work successfully in a cost-effective manner to meet your organization's needs and objectives.

#### Relevant experience and knowledge

PwC is an advisor to 44 of the world's top 50 banks, 46 of the world's top 50 insurance companies, and the leading service provider to investment managers, pension funds, and hedge funds around the world. This diverse client base provides us with unique access to develop peer insights and to understand from experience what works in specific client circumstances. We also have invested in developing relevant thought leadership, methodologies, templates, and tools in a number of areas.

#### Trusted brand

We offer a truly independent view, without prejudice or favor regarding specific vendors, solutions, or approaches. We approach each situation and develop the most appropriate solutions, depending upon the client's individual circumstances.

#### Global footprint

PwC works with our clients in a globally integrated manner. This benefits our clients in terms of consistent service delivery and quality by taking advantage of the best ideas, resources, and solutions from around the world.

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