



# Investment Management Solution



# Charles River Investment Management Solution

Charles River IMS automates front and middle office investment management functions for buy-side firms in the institutional asset and fund management, private wealth, alternative investments, insurance, banking and pension markets. Charles River helps clients make better investment decisions, streamline operations and reduce risk.

PORTFOLIO MANAGEMENT & RISK ANALYTICS		CROSS-ASSET TRADING & EXECUTION			MIDDLE OFFICE	
Portfolio Construction	Ex-Ante Risk	Order Management	Commission Management	Post Trade & Settlements	Collateral Management	
PMA	Scenario Analysis	Execution Management	TCA	Venue Support	SWIFT	
Optimization	Reporting	Inventory	FIX	OTC Clearing	Block & Allocation Matching	
ASSET CLASS COVERAGE	Equity	Fixed Income	OTC	FX/Cash	Alternatives	
REGULATORY & COMPLIANCE	Portfolio Compliance	Trade Compliance	Global Shareholder	MiFID II	Regulatory Reporting	
POSITION MANAGEMENT (IBOR)	Multi-Party Reconciliation	Real-Time Cash/Positions	Corporate Actions	Other Regulations	Compliance Services	
DATA	Analytics	Benchmarks	Security Master	EDM	Data Management Services	
DESKTOP, WEB AND MOBILE ACCESS		FIX NETWORK	DELIVERED AS A SERVICE IN A PRIVATE CLOUD			

## For 20+ Years

Charles River has distilled the best practices from a diverse, global client base and incorporated them into the Charles River Investment Management Solution (Charles River IMS). With a long term view and singular focus on the front and middle office, Charles River has helped large and small firms achieve:

- Better informed investment decisions
- An enterprise-wide view of investments and exposures
- Accurate, timely and consistent data across the investment process
- Consolidation of disparate point solutions on a single platform

## Today

Investment firms in more than 40 countries use Charles River IMS to manage more than US\$25 Trillion in assets in the institutional investment, wealth management and hedge fund industries. Clients rely on Charles River to:

- Improve trade execution
- Monitor & reduce risk
- Simplify & streamline operations

## Tomorrow

In an environment of ever-changing markets, competitive and regulatory pressures, Charles River continues to invest heavily in R&D to help clients:

- Grow and retain assets through continuous innovation
- Diversify and expand products and geographic coverage
- Keep up with regulatory requirements

## End-to-End Investment Lifecycle Support

Charles River IMS supports the entire investment lifecycle on one platform, from portfolio management and risk analytics to trading and post-trade settlement, with the broadest available asset class coverage and integrated compliance throughout.

An Investment Book of Record (IBOR) further improves efficiency and accuracy by removing dependence on back-office data feeds. Charles River's Enterprise Data Management (EDM) capabilities help firms improve the consistency and completeness of their reference, analytics, pricing, and benchmark data.

## Software as a Service (SaaS) Deployment

Charles River IMS is delivered as a hosted service, with integrated data and end user support, enabling clients to access the latest functionality faster, improve data quality, and streamline operations. This simplified Software as a Service (SaaS) operating model helps clients respond more quickly to business, investor and regulatory demands. This increases end user satisfaction, ensures more predictable costs, and helps improve reliability.

The SaaS-based offering includes seamless upgrades and 24/7, follow-the-sun support provided by Charles River's in-house support staff. Most importantly, Charles River provides the proper foundation for the investment process by providing, validating and managing all necessary data.

## One Platform for Multiple Business Lines

Charles River IMS combines best of breed components in a platform that meets the diverse and demanding requirements of buy-side firms, including:

- Institutional asset and fund managers
- Private banks and wealth managers
- Alternative investment managers and hedge funds
- Pensions and insurers

Best practice workflows help improve staff productivity, and a highly scalable and configurable open architecture enables clients to consolidate multiple business lines on a single platform. Charles River IMS supports the full spectrum of financial product offerings, from basic asset class-specific products to solution oriented and complex multi-asset products.

## Anytime, Anywhere Access

Charles River provides flexible end user deployment options and easily scales to support thousands of users. In addition to desktop deployment, a configurable browser-based dashboard allows financial advisors to quickly personalize information for managing complex accounts and high-touch client relationships. Advisors and client-facing users can make in-person meetings more interactive by using tablets as graphical reporting and presentation tools. Charles River's mobile app provides remote access and gives users a "big picture" view into Charles River IMS when away from the office.

### Key Advantages

- Make better investment decisions
- Improve trade execution
- Streamline middle office operations
- Reduce cost, risk & complexity
- Increase end user productivity & satisfaction
- Launch new products faster



*Charles River offers seamless browser-based and mobile device access to portfolios, exposures and trades, and desktop deployment for enterprise workflows.*

# Market Segments

## Institutional Asset & Fund Management

By managing separate funds and investment products on a single enterprise solution, firms are able to automate their investment process, streamline workflows and reduce the points of integration that contribute to inefficiencies and errors:

**Improve decision making** with centralized portfolio construction, management and analysis

**Increase trader productivity** with a single order and execution management system

**Access risk management**, scenario analysis, and attribution directly from the portfolio management workspace

**Automate compliance checking** throughout the investment lifecycle

### Key Advantages

- Grow & retain assets
- Diversify products
- Expand geographies
- Keep up with regulatory requirements
- Simplify systems & operations
- Reduce risk & cost

## Wealth Management

Charles River provides institutional capabilities that support discretionary and non-discretionary private wealth product lines, enhance client interactions, and efficiently manage large volumes of accounts and trades:

**Speed introduction of new products** with built-in support for all asset classes, including unit trusts, ETFs, futures, options and fixed income

**Support region-specific frameworks and products**, such as SMA, UMA, UMH, Rep as Manager, and Mutual Fund Wraps

**Effectively implement investment strategies** using characteristic-based allocation models and custom benchmark portfolios

**Ensure tax-efficient portfolios** and tax optimization across households

**Maintain a holistic view** of family assets, including household and multi-generation views

**Improve throughput** by rebalancing high volumes of separately managed, unified and household accounts

**Enrich client presentations** with graphical reports on mobile devices

## Alternative Investment Management & Hedge Funds

Charles River's enterprise solution meets the requirements of both large and small organizations, enabling alternative investment managers to:

**Create and manage multiple strategies and sub-strategies** with institutional capabilities across all asset classes, including derivatives & FX

**Minimize ramp-up time** with out-of-the-box templates for quick set-up and flexible configuration of user interfaces and workflows

**Support active management styles** with portfolio analytics and execution capabilities, providing a global view of investment performance and risk, and the ability to monitor P&L in real time

**Alleviate staffing and infrastructure pressures** with a turnkey solution that simplifies day-to-day operations and scales with business needs

**Streamline regulatory obligations** such as global shareholder disclosure (GSD) reporting with automated compliance checking and built-in libraries



# A Simplified Operating Model

SaaS-based deployment provides clients with significantly faster access to new capabilities and ensures the necessary data for Charles River IMS. Clients can leverage the economy of scale in Charles River's global support teams and the expertise that comes from supporting a diverse client base. Having a single point of contact for software, hardware, data and connectivity saves time and improves accountability.

## Data Services & Support

Investment management systems consume enormous quantities of data, and ensuring consistent data quality is one of the biggest challenges for buy-side firms. Managing ever-growing data volumes across instrument types is an industry-wide problem that is compounded by frequent changes and quality issues with data providers. Charles River alleviates data problems by providing an all-inclusive data solution incorporating:

**The Charles River Data Service** using best of breed providers, that maps and enriches reference and real-time data, and supports new security setup

**Certified interfaces** that work out-of-the-box and are continuously maintained and managed by Charles River to Bloomberg, Thomson Reuters, and IDC.

**An Investment Book of Record (IBOR)** to ensure an accurate view of positions and cash throughout the trading day

**Additional providers based on asset class** with standardized integration and support (e.g., FinCAD analytics) and mortgage pre-payment models

**Enterprise Data Management (EDM) facilities** to manage, monitor and promote gold copy data within Charles River IMS and to other systems

**A data management service** to ensure a high quality security master

Charles River helps reduce data costs, technical issues and administrative headaches by managing the entire data process for clients, aggregating all necessary data and incorporating it directly into the Charles River IMS for over a thousand data fields.

## SaaS-based Delivery

Charles River keeps software current by managing regular upgrades and ensuring optimal application performance and reliability. Application specialists manage Charles River IMS according to best practices, and provide application and integration expertise that is difficult for firms to build and maintain in-house.

## Compliance Advisory Services

Charles River's compliance services team provides a level of knowledge and depth of skills difficult to maintain with in-house staff alone. Compliance Advisory Services act as an extension of the client's compliance organization to ensure that their compliance rules and workflows are efficient, follow accepted best practices and align with client mandates and regulatory requirements.

## FIX Connectivity

Charles River's broker-neutral financial network supports global electronic trading via FIX with access to over 600 global liquidity venues. Full integration facilitates direct access between buy-side clients, sell-side brokers and trading venues to simplify operations and improve trading reliability. Charles River provides complete FIX administration, connectivity management and support. Continuous testing, certification and monitoring of sell-side end points increases service levels and end user satisfaction.

### Key Advantages

- Up-to-date software and technology
- Better data quality & accuracy
- Improve day-to-day operations
- Minimize staff requirements & training
- Lower technology costs
- ISO 27001 security certified globally

# Portfolio Management

Charles River IMS provides extensive portfolio management and analytics for fixed income, equity, FX and derivatives on one platform with integrated data. Data visualization and aggregation capabilities and best practice workflows provide portfolio managers with a readily familiar tool that is easy to use and frees them from dependency on spreadsheets. Integrated performance measurement and risk management provide real time visibility into performance and risk exposure. Scenario analysis and advanced analytical capabilities help portfolio managers understand investment risks.

## Key Capabilities

- Portfolio construction
- Asset allocation & rebalancing
- Ex-ante risk
- Value-at-Risk (VaR)
- Scenario analysis
- Ex-post risk
- Performance measurement & attribution

Account	Grand Totals				00_02_YEARS				02_04_YEARS			
	New %	% Active	Duration	Dur Active	New %	% Active	Duration	Dur Active	New %	% Active	Duration	Dur Active
Positions Grand Total	98.70	(1.49)	5.614	(0.020)	28.81	3.78	0.340	0.056	22.35	(1.18)	0.691	(0.012)
Investments	33.42	5.46	1.556	0.189	9.85	1.92	0.105	0.014	7.57	0.81	0.228	0.023
EUR - European Euro	22.74	19.60	2.492	2.280	1.64	0.83	0.016	0.008	2.06	1.46	0.067	0.049
CAD - Canadian Dollar	18.66	17.98	0.436	0.412	10.04	9.73	0.134	0.130	7.38	7.17	0.228	0.222
SEK - Swedish Krona	12.82	11.27	0.829	0.759	1.28	0.80	0.012	0.007	1.85	1.48	0.060	0.049
Europe Bloc	8.28	7.79	0.169	0.143	5.22	5.04	0.064	0.063	2.50	2.41	0.081	0.078
DKK - Danish Kroner	1.24	(4.74)	0.051	(0.466)	0.53	(0.06)	0.005	(0.002)	0.21	(0.90)	0.007	(0.026)
GBP - United Kingdom Pound	0.79	(31.51)	0.037	(1.767)	0.15	(7.86)	0.001	(0.099)	0.35	(7.18)	0.009	(0.215)
USD - US Dollar	0.71	(0.62)	0.032	(0.016)	0.02	(0.39)	0.000	(0.005)	0.37	(0.05)	0.009	(0.002)
AUD - Australian Dollar	0.07	(0.39)	0.003	(0.026)	0.02	(0.04)	0.000	(0.001)	0.02	(0.09)	0.001	(0.003)
Dollar Bloc	0.07	(23.43)	0.004	(1.404)	0.01	(5.42)	0.000	(0.052)	0.01	(5.61)	0.000	(0.167)
JPY - Japanese Yen	0.05	(2.44)	0.003	(0.109)	0.00	(0.80)	0.000	(0.008)	0.01	(0.65)	0.000	(0.019)
Asia Bloc	0.02	(0.28)	0.001	(0.017)	0.02	(0.01)	0.000	(0.000)	0.01	(0.07)	0.000	(0.000)

With Charles River's centralized workspace, portfolio managers can easily view their accounts, drill down to holdings, and display multiple concurrent views of the same accounts.

## Fixed Income

Charles River IMS provides portfolio analysis tools and analytics for standard and emerging corporate bond markets, a comprehensive set of government bond types from more than 50 countries, plus fixed income derivatives, including interest rate and credit default swaps, forwards, futures and options. Fixed income views can group portfolios by multiple classifications, including sectors, ratings, issuers and duration bands, with flexible drill-down, enabling portfolio managers to:

**Evaluate portfolio strategies** by conducting benchmark comparisons and dispersion analysis

**Manage risk** leveraging Charles River's powerful built-in analytics tools and third-party sources for exposure management, sensitivities, risk analytics, stress testing, ex-post risk, Value-at-Risk (VaR) and ex-ante risk

**Understand portfolio-level impact** before generating orders by proposing on either a "what if" or "generic" basis

## Equity

Charles River's portfolio analysis tools support equities and equity derivatives, including futures, options, and total return swaps. Portfolio managers can implement active and passive investment strategies using asset allocation and security selection tools. Workflows can be optimized for one or many portfolios using customizable views to:

**Efficiently manage holdings** by targeting on country, region, currency, industry/sector, and market capitalization roll-ups

**Fulfill organizational and fund mandates** by rebalancing portfolios or utilizing cash invest/divest capabilities to align positions with their respective model or index

**Determine risk impact** of potential orders by conducting hypothetical "what-if" analysis

**Optimize operations** by automatically factoring client-specific restrictions into all order generation activities

### Advanced Capabilities

- Strategy/model management
- Currency overlay management & hedging
- Instrument exposure look-through
- Investment Book of Record for accurate holdings information

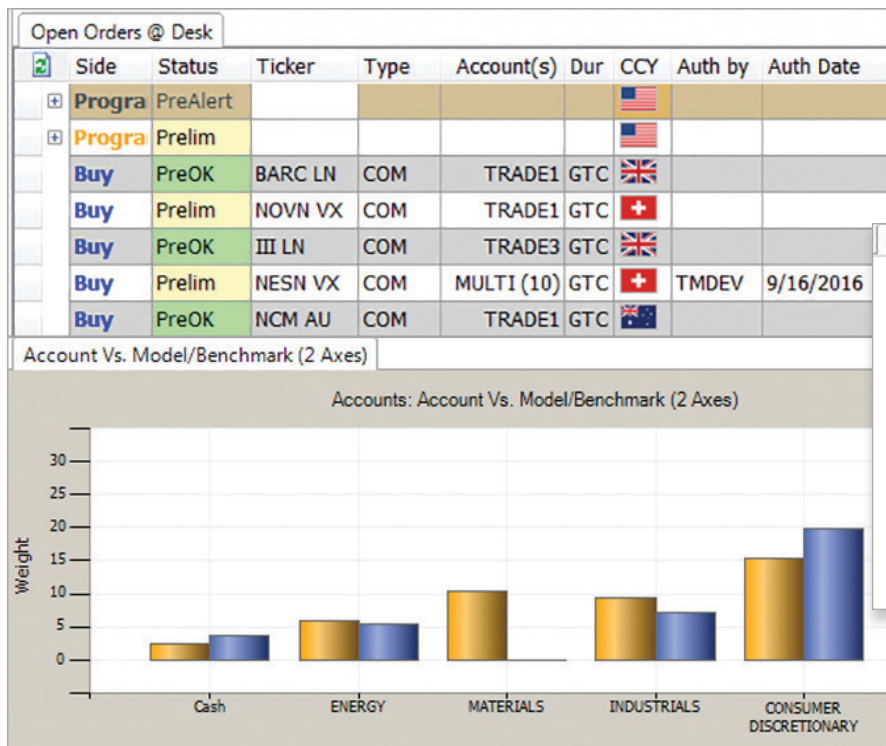
## Foreign Exchange

Full multi-currency support allows portfolio managers to view any portfolio in any currency, using real-time FX rates, enabling them to:

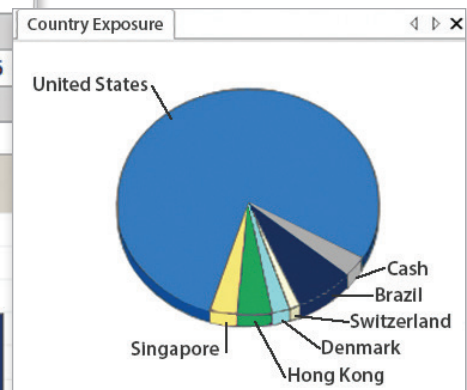
**Effectively manage and hedge currency risk** with currency overlay

**Quickly assess FX/hedging needs** with currency-based settlement day forecasting and flexible viewing options (by asset currency, currency clusters, across portfolios, etc.)

**Fine-tune currency exposure** by consolidating/rolling forward positions



Flexible tools enable portfolio managers to classify their holdings and implement investment decisions for one or many portfolios, align positions with benchmarks or models, and monitor the status of orders across the trading desk.



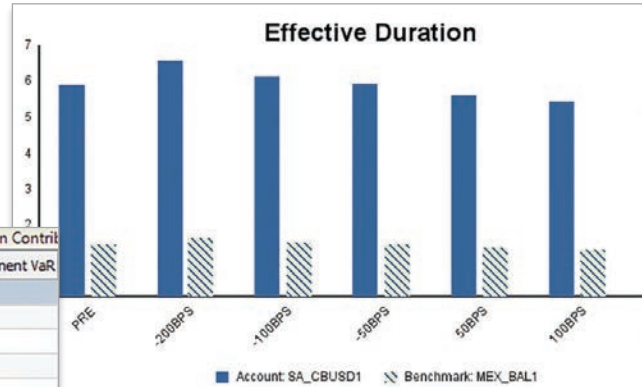
Comprehensive multi-currency and FX support help portfolio managers manage currency exposure across global portfolios.

# Risk Management & Scenario Analysis

Integrated risk management and scenario analysis functions enable firms to meet client and regulatory demands for greater transparency and stricter guidelines throughout the investment process. Charles River IMS provides portfolio managers, risk managers and compliance officers with curve-based analytic measures, ex-post and ex-ante risk metrics, accessible directly from portfolio management workflows and reports.

With Charles River IMS, risk measurement and modeling become an integral part of daily portfolio management activities, using the same data and metrics as quants and risk analysts.

Security Name	Ticker	95% VaR	95% Tail Risk	95% Component VaR	Return Contrib
<b>Accounts</b>					
RISK_USEQ1					
Cash					
Investments					
ENERGY EQUIPMENT & SERVI...					
BAKER HUGHES INC COM	BHI	3.467	5.542		(0.015)
HALLIBURTON CO COM	HAL	3.919	5.821		(0.004)
SCHLUMBERGER LTD COM	SLB	3.274	4.433		(0.025)
Totals for ENERGY EQUIPME...		3.170	4.612		(0.044)
OIL, GAS & CONSUMABLE FU...					
ANADARKO PETE CORP COM	APC	4.155	7.020		(0.050)
CONOCOPHILLIPS COM	COP	2.155	2.958		(0.011)



	Parallel Shift(bps)	Custom Shift
Global Stress Scenario 1	50	
Australian Dollar	100	
European Euro	150	
Greece	700	
Italy	250	
Japanese Yen	Down 40% to 3Y, then up 30%	
United Kingdom Pound Sterling	50 basis point bear inverse	
US Dollar	50 basis point bear steepener	

Flexible scenario definitions help investment managers analyze the full spectrum of conditions and stress events as defined by regulators or anticipated by portfolio managers.

**Make more informed decisions** by viewing key rate durations and sensitivities to other analytical factors for the entire portfolio and benchmark, calculated natively

**Stress-test portfolios** by specifying interest rate and credit scenarios; view effects on the portfolio and benchmark for portfolio fair value, yield, duration and other analytics

**Centralize risk management** via seamless integration with Charles River's compliance functions automates risk monitoring across the enterprise

**Increase visibility of ex-post and ex-ante risk metrics** including risk contribution and attribution for tracking error, volatility, variance, information ratio, beta; summary risk measures include Jensen's alpha, Sharpe ratio, Treynor ratio, Sortino ratio, downside risk and others; calculate Value-at-Risk (VaR) using historical simulation, as well as ex-ante volatility and tracking error (TE) using Charles River's statistical factor model or a third party factor model



# Performance Measurement & Attribution

Charles River IMS enriches the portfolio management process with up-to-date performance measurement and attribution analysis (PMA) and facilitates GIPS compliance, without the need to integrate a standalone PMA system. Users can directly access all return, contribution, attribution and risk data for each portfolio, for a variety of timeframes and user-defined classification levels. Charles River reference and pricing data reduces operational complexity and helps ensure a consistent view of performance and attribution across the firm. Users can also perform backward-looking performance analyses for any historical time period or account using multiple search criteria.

**Eliminate standalone systems** with fixed income and equity performance and attribution on a consolidated platform

**Provide context for decision making** by analyzing results directly within the portfolio management workspace or via reports

**Streamline workflows** with “look-through” calculation down to the individual security level and dynamic recalculation of results when methodologies and classifications are changed on the fly

**Reflect investment objectives and/or strategies** using custom blended benchmarks

**Automatically reconcile performance contribution, attribution and ex-post risk data** by eliminating multiple data feeds from disparate systems

**Reduce “noise” and inaccuracies** by easily restating performance data (price changes, corporate actions, etc.)

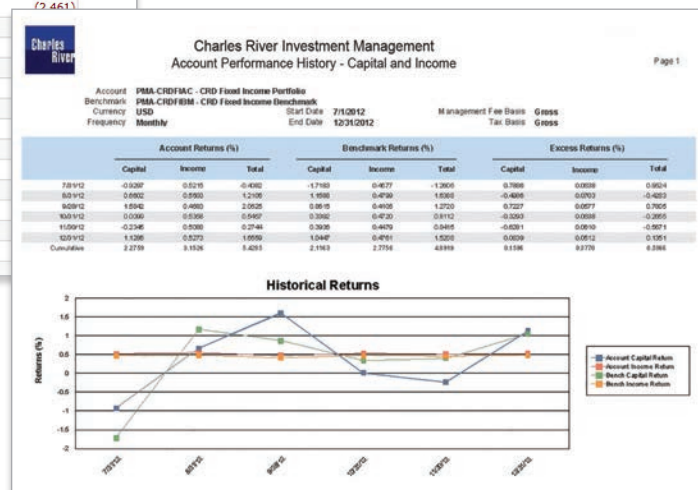
**Automate GIPS support** with rules to maintain GIPS composite memberships; standard reports include firm and composite disclosures

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**Account View**

Account	Total Amount	Acct Base Return (1Q)	Bmk Base Return (1Q)	Acct B
Accounts				
PMA-CRDINTAC				
Cash	1,167,717			
Investments				
Australian Dollar				
Australia	235,792,000	(0.932)	1.503	
Totals for Australian Dollar	235,792,000	(0.932)	1.503	
Swiss Franc				
Switzerland	(77,812,105)	(2.461)	(2.461)	
Totals for Swiss Franc	(77,812,105)	(2.461)	(2.461)	
Danish Kroner				
Denmark	317,065,966	(7.131)	(7.131)	
Totals for Danish Kroner	317,065,966	(7.131)	(7.131)	
European Euro				
Germany	255,280,970	14.266		
Spain	55,410,685	1.576		
Finland	185,288,000	10.448		
France	536,052,700	19.934		
Ireland	2,304,666			
Italy	11,610,000			
Totals for European Euro	1,045,947,021	12.314		
United Kingdom Pound Sterling				

Performance reports provide detailed breakdowns of performance figures and summarize results in bar or trend charts that can be viewed from Charles River IMS or a web browser.



Configurable workbench views consolidate performance contribution, attribution and ex-post risk results for portfolio managers.

# Trading & Execution

With Charles River's combined order and execution management system (OEMS), traders can work more productively by creating, placing and executing orders in one trading blotter. Traders can manage trade execution strategies, streamline complex workflows into "one-click" execution, act on an entire program as if acting on a single order, and monitor market data and active orders. Full integration with portfolio management functions enables better communication between traders and managers. Interfaces with sell-side and execution venues support cross-asset class coverage.

Charles River's trading blotter offers numerous advantages over discrete order and execution systems. Traders can work more efficiently by eliminating multiple interfaces, fragmented workflows and order staging problems inherent in utilizing separate order and execution platforms. Traders no longer have to switch between systems or re-key critical information, which saves time and reduces errors. Benefits beyond the trading desk include improved compliance and auditing, and greater collaboration between traders and portfolio managers.

## Key Capabilities

- Order & execution management
- Data charting & visualization
- Trading analytics & transaction cost analysis (TCA)
- Broker & commission management

## Fixed Income

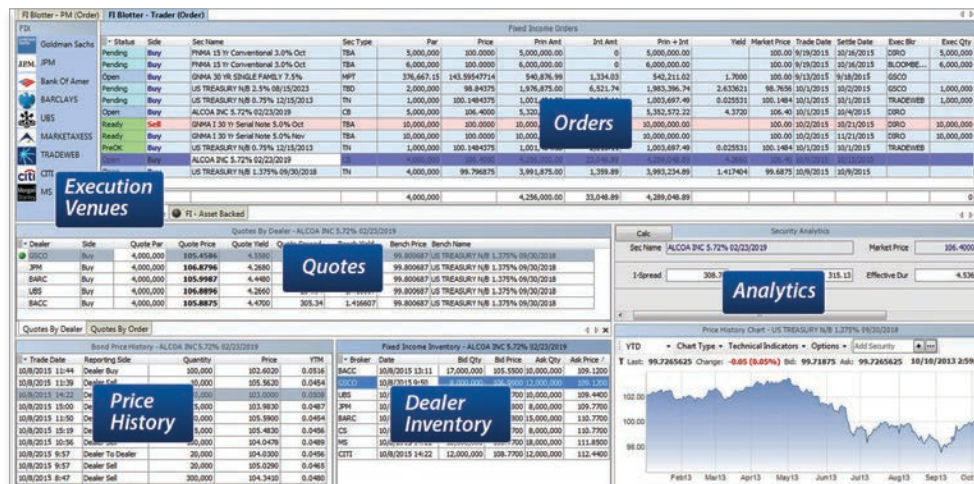
Charles River IMS improves trader decision making with quick and efficient workflows and built-in quote management. Traders can find liquidity and negotiate with counterparties, monitor the market, and execute both cash and derivative trades, with:

**Comprehensive asset class support** including government, investment grade, high yield, municipal, structured, inflation-linked, emerging market debt, TBA, and listed and OTC derivatives

**Accurate and up-to-date security information**, including benchmarks and curves, with tight integration to fixed income market data providers

**Integration with leading fixed income ECNs**, allowing traders to stage orders and receive completed trade details after execution

**Advanced trading capabilities** including generic order handling, multiple-quote support, streamlined booking of complex swaps, trading on price, yield, spread, swap rate and deal spread



Charles River's configurable trading blotter automates manual processes with integrated quoting and built-in access to trading platforms.

## Equity

Equity traders require quick access to all relevant data and liquidity. Charles River's intuitive trading blotter encompasses all the key workflows for equity cash and equity derivative orders, including:

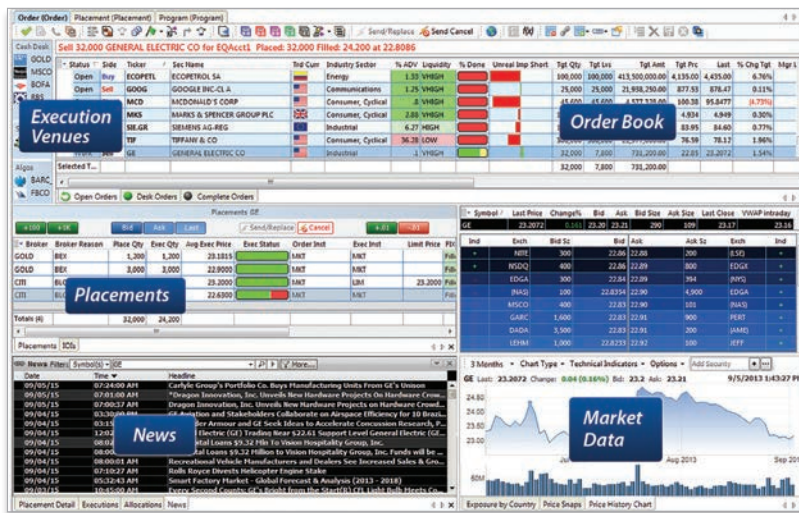
**Easy access to fundamental trading analytics** at all stages of the trade lifecycle, with integrated transaction cost analysis (TCA) from order generation through execution

**Support for multiple trading methods and strategies** including program trading, single name trading, algorithmic trading, DMA trading and spread trading

**Freedom to focus attention on more complex, less liquid orders** by utilizing automated smart order routing for low touch orders

**Integrated critical market data and charting**, including real-time level I and level II exchange data, price history, news, watchlists, time and sales, and venue analysis

**Built-in access to liquidity** with a broker-neutral FIX network, providing connectivity to more than 600 trading destinations and ability to quickly add new destinations



### Key Capabilities

- Real-time market data
- Automated smart order routing
- Program/list trading
- Algo trading
- Multi-leg spread trading
- DMA trading
- Venue analysis
- Pre- & post-trade TCA

Charles River brings together the tools and data traders need to effectively implement trading strategies.

Charles River helps traders achieve best execution by gathering multiple quotes and automatically identifying the best rate.

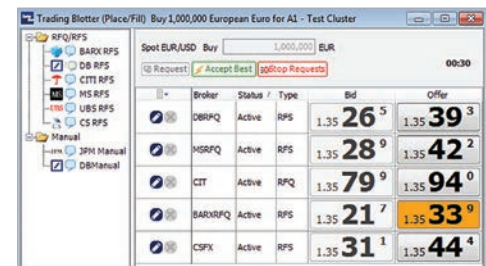
## Foreign Exchange

Charles River's automated FX capabilities help investment managers hedge out currency exposure and risk, and reduce the cost of settlement for cross-border trading. Charles River enables firms to manage their own FX trades with a highly efficient workflow that easily links FX trades back to the original equity, fixed income or derivative trade, and ultimately reduces costs with:

**Fully automated settlement and hedging trades** based on pre-defined settlement and hedging rules

**Complete transparency into portfolio cash** through full integration to cash flow forecast

**Direct access to multiple liquidity destinations** including bank direct, ECNs and bank algorithms



**Streamlined access to the best rate** through streaming quotes (RFQ/RFS)

**Best execution analysis and reporting**, including the ability to store historical quotes



# Compliance

Charles River helps clients meet increasing regulatory obligations with centralized compliance monitoring and management capabilities, and advisory services that utilize a comprehensive library of built-in rules for worldwide regulatory requirements and mandates, including US SEC 1940 Act and Rule 2a-7, UCITS and ESMA, MiFID II, Dodd-Frank, KAGB, global shareholder disclosure (GSD) regulations and others. Charles River IMS automates the compliance workflow and provides advanced compliance rule building, testing and maintenance, customizable reporting and a complete audit history, including the ability to:

**Reduce intra-day risk** by validating compliance at any stage of the trade lifecycle: pre-trade, in-trade, post-execution, end-of-day/post-trade

**Streamline portfolio management workflows** by incorporating compliance rules into “what-if” analysis

**Optimize compliance monitoring** by prioritizing and filtering alerts

**Easily trace violations** and perform historical trend analysis through “As of” compliance reporting

**Supply regulators and auditors** with end-to-end audit trails and extensive trade compliance reporting

**Improve responsiveness** to alerts and warnings via browser or mobile device

**Stay current with best practices, client mandates and regulatory requirements** by leveraging Charles River’s Compliance Rule Advisory Service and Global Shareholder Disclosure Service

## Key Capabilities

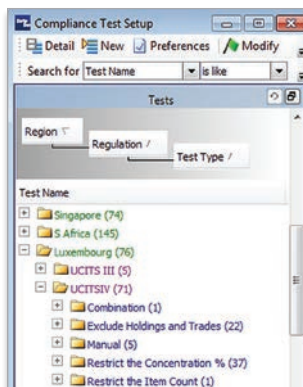
- Compliance monitoring over investment lifecycle
- Comprehensive rule libraries
- Rule building & testing
- Model compliance
- Advisory & Global Shareholder Disclosure Services
- “As of” compliance
- Derivative exposure calculations
- Calculation builder
- Integrated VaR monitoring
- “Four Eyes” test authorization

*Charles River automates compliance validation and monitors risk across the trade life cycle.*

Orders													
Status	Side	Order Account	Sec Type	Ticker	Sec Name	Sec Find	Mkt Prc	Mgr Limit	Tgt Qty	Freeze	Basket	Trd Curr	Tgt Prc
PreAlert	Buy	US_Equity_Account	COM	IBM	International Bus. Machines		100.0000		5,000	<input type="checkbox"/>	US_Equity_Ba_USD	100.0000	
PreAlert	Buy	US_Equity_Account	COM	GOOG	Google Inc		500.0000		1,000	<input type="checkbox"/>	US_Equity_Ba_USD	500.0000	
PreOK	Buy	US_Equity_Account	COM	F	Ford Motor		70.0000		10,000	<input type="checkbox"/>	US_Equity_Ba_USD	70.0000	

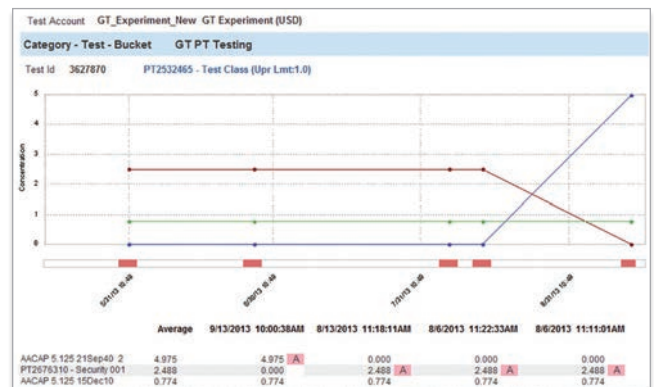
  

Violations on Orders					Comments on Violations	
Status	Severity	Test Name	Alert Limit	Concentration	Create Date	Comment
Closed - No Action	Alert	No more than 20% of equity in technology sector	20	22.7	9/12/2013 18:26	Portfolio Compliance Concentration was at 21%
New	Alert	No more than 2% of IBM	2	3.5	10/3/2013 10:30	Closed by Compliance Officer. PM is going to rebalance the accou
New	Warning	No more than 5% from the issuer IBM	5	3.5	10/3/2013 10:30	RESPONSE: Set STATUS to Closed - No Action



*Rich repository of compliance rules and advanced rule-building tools provide diverse instrument and regulatory support.*

*Comprehensive reporting tools, including historical trend analysis and “As of” reporting, provide documentation needed for regulatory or audit inquiries.*





# Middle Office

## Post-Trade Matching, Confirmation & Settlement

Charles River automates the post-trade process and provides centralized confirmation, trade matching and settlement instruction workflows. For each transaction, dealers and traders, portfolio managers, compliance, and operations personnel have the same real-time view of all post-trade processing activity and data. The resulting low-touch settlement process minimizes manual steps and enables investment managers to:

**Expedite settlement** by routing individual trades and allocations in real-time to facilitate same-day matching and confirmation

**Reduce failed trades and settlement issues** with consistent views of post-trade activity and data

**Manage “by exception”** with personalized views and alerts that save time and speed up corrective intervention

Charles River IMS automatically routes transaction details and ensures central or local matching with flexible exception management and configurable, rule-based local tolerance matching. Built-in interfaces include:

- Omgeo OASYS, CTM & TradeSuite
- MarkitSERV swap clearing
- FIX 4.2 or 4.4 allocation workflow
- Local match/affirm with any destination
- ISO 15022/SWIFT for custodian notification

### Key Capabilities

- Collateral Management
- Block & allocation matching
- Accounting import/exports
- OTC clearing
- Reconciliation
- Automated straight through processing
- Exception management
- SWIFT communication with custodians

## Investment Book of Record (IBOR)

Charles River’s Investment Book of Record provides traders and portfolio managers with an accurate and real-time view of positions and cash. IBOR provides an investment-centric view of positions that reduces trade errors and time spent manually reconciling position data.

Charles River increases confidence in investment decisions by providing consistent position data and actionable analytics throughout the investment process. IBOR makes position data available to downstream systems including reporting, performance attribution and risk management, enabling them to access the same view of positions in real time.

Incorporating IBOR in Charles River IMS enables organizations to decouple the front and back office, and helps firms that do not have an accounting system and rely solely on feeds from custodians and prime brokers. It also benefits wealth managers who need to consolidate positions from multiple accounting systems, or control tax lot tagging for newer multi-sleeve or multi-strategy products. Charles River’s IBOR solution allows users to:

**Improve accuracy and reduce end-of-day processing time** by eliminating dependency on back office data

**Reduce the possibility of trading errors and compliance violations** by ensuring that managers are trading on complete information

**Help portfolio managers remain fully invested** by providing accurate intraday cash balance information

**Increase transparency and improve record keeping** by incorporating external transactions that affect positions

### Key Capabilities

- Audit trail of transactions and positions
- Exception based position reconciliation
- Supports mandatory & voluntary corporate actions
- Full security lifecycle support

# Wealth Management

Charles River offers financial advisors, private banks and wealth managers a comprehensive and fully integrated solution that eliminates the need for multiple systems. Solution capabilities include mobile and browser based access, highly performant central overlay, multi-custodial position management, detailed performance analysis, and a communication hub.

## Key Advantages

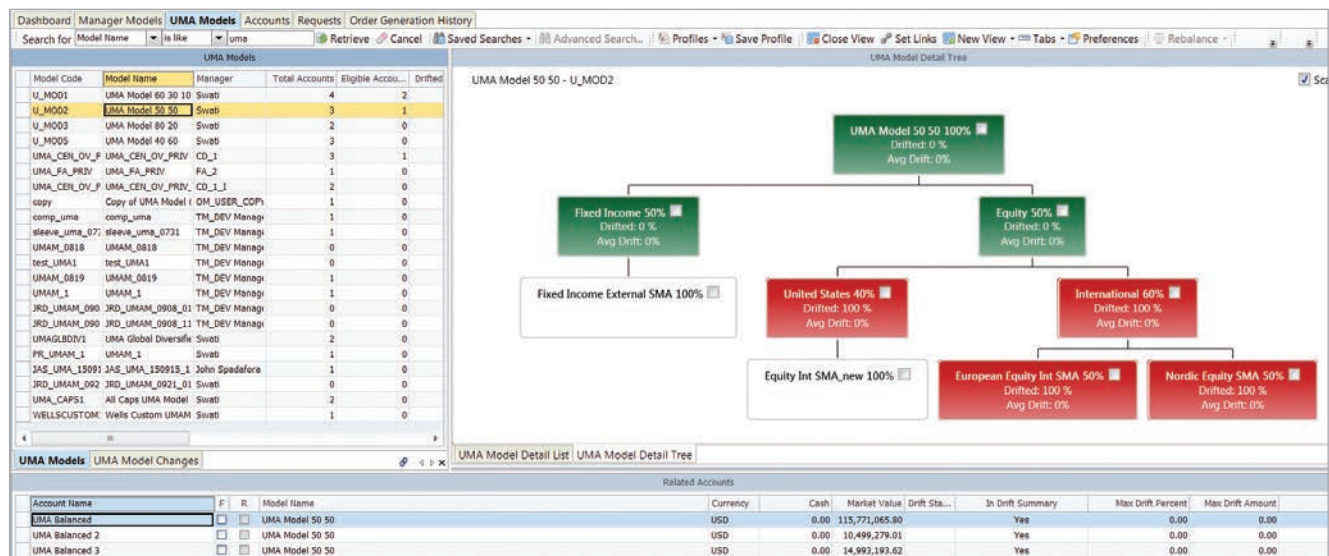
- Manage all discretionary and non-discretionary products on one platform
- Automate and streamline communication with sponsors
- Speed time to market for innovative product offerings
- Streamlined deployment of advisor-driven strategies with centralized portfolio management

## Central Overlay

**Exception-based workflows** for identifying accounts requiring attention

**Highly performant managed account** overlay functionality

**Meets the demanding requirements** of high-volume sponsor firms with millions of accounts



*Central overlay capabilities facilitate highly scalable management of SMA/UMA products and tax-based trading.*

## Anywhere / Anytime Access

**Browser-based access to portfolio management tools** integrated with an order management system for financial advisors, executives and compliance officers

**Tablet and phone access** to key account information improves engagement with high-touch client relationships

**Allows advisors to quickly personalize information** for managing complex accounts and client relationships

**Increased mobility** makes advisors more productive and minimizes lost opportunities for engagement with prospects

# Wealth Hub

Enables wealth managers to automate and streamline communication with sponsors

Simple, dashboard based communications

Secure, single-click account and model updates to all applicable sponsors

Streamlines operations by eliminating the need to learn and interact with multiple sponsor platforms

Replaces email exchanges and provides more reliable, auditable transmission of data

Allows managers to offer services to a larger number of sponsors

Helps eliminate low value, error prone manual workflows

Supports model management, account requests, order workflows and receiving positions and tax lot data from sponsors

## Multi-Custodial Position Management and Reconciliation

Provides real-time position management for large volumes of accounts and positions

Critical for managers running sub-advised mandates

Provides an investment-centric view of positions

Current Position/Tax Lot										Transaction			Position/Tax Lot Snapshot			Recon			Corp Action																	
Retrieve										New			Copy			Delete			Cancel			Post			Replace			Include In Batch			Exclude From Batch			Replay		
Positions										Position History																										
Position Id	Account	Sec Name	L/S	Quantity	Original...	Base Avg Unit Cost	Base Orig Cost	Replay Status	Rel	Txn Date	Message Text	Action Time																								
258798	UMA1.PORT	DELL ORD	Long	112.30		12.840605521	1,442.00			4/2/2017	New position inserted. { Quantity=100; Base Original Cost=1	4/2/2017																								
286961	UMA1.PORT-2	DEVELOPERS DIVER	Long	200.00		6.6300	1,326.00			4/6/2017	Changed Quantity from 100 to 50.	4/2/2017																								
258805	UMA1.PORT-2	DELL ORD	Long	112.30		12.840605521	1,442.00			4/6/2017	Changed Base Average Unit Cost from 17.7686 to 35.5372.	4/2/2017																								
628064	UMA1.ROOT	JDS UNIPHASE ORD	Long	40.00		12.9650	518.60			4/6/2017	Changed Base Original Cost from 1,776.86 to 888.43.	4/2/2017																								
627938	UMA1.ROOT	MICROSOFT ORD	Long	60.00		17.768666667	1,066.12			4/6/2017	Changed Base Average Unit Cost from 35.5372 to 17.7686.	4/2/2017																								
286817	UMA1.PORT-2	HASBRO ORD	Long	200.00		24.6950	4,939.00			6/12/2017	Corporate Action Transaction processed for position which ch	6/12/2017																								
287832	UMA1.PORT	FORTUNE BRANDS	Long	150.00		42.093333333	6,314.00			6/12/2017	Corporate Action Transaction processed for position which ch	6/12/2017																								
627902	UMA1.PORT	MICROSOFT ORD	Long	50.00		17.7686	888.43			6/12/2017	Transaction cancelled. Revert Quantity from 100 to 50.	6/12/2017																								
627839	UMA1.PORT-2	European Euro	Long	(1,479.89)			0			6/12/2017	Transaction cancelled. Revert Base Average Unit Cost from 8	6/12/2017																								
287096	UMA1.PORT	DEVELOPERS DIVER	Long	200.00		6.6300	1,326.00			6/12/2017	Corporate Action Transaction processed for position which ch	6/12/2017																								
282938	UMA1.PORT	HASBRO ORD	Long	600.00		24.6950	14,817.00			6/12/2017	Corporate Action Transaction processed for position which ch	6/12/2017																								
287856	UMA1.PORT-2	FORTUNE BRANDS	Short	(150.00)		42.093333333	(6,314.00)			6/12/2017	Transaction cancelled. Revert Quantity from 100 to 50.	6/12/2017																								

Positions										Position History									
Tax Lots										Tax Lot History									
Txn Date	Settle Date	Status	Initial Qty	Curr Qty	Strategy 1	Strategy 2	Custodian	Txn Date	Message Text	Action Time									
4/2/2017	4/2/2017	Open	100	50				4/2/2017	New lot inserted. { Initial Quantity=100; Current Quantity=1	4/2/2017									
								4/6/2017	Changed Current Quantity from 100 to 50.	4/2/2017									
								4/6/2017	Changed Base Original Cost from 1,776.86 to 888.43.	4/2/2017									
								6/12/2017	Corporate Action Transaction processed for lot which changes	6/12/2017									
								6/12/2017	Corporate Action Transaction processed for lot which changes	6/12/2017									
								6/12/2017	Transaction cancelled. Revert Current Quantity from 100 to 5	6/12/2017									

Positions										Position History									
Tax Lots										Tax Lot History									
Txn Date	Settle Date	Status	Initial Qty	Curr Qty	Strategy 1	Strategy 2	Custodian	Txn Date	Message Text	Action Time									
4/2/2017	4/2/2017	Open	100	50				4/2/2017	New lot inserted. { Initial Quantity=100; Current Quantity=1	4/2/2017									
								4/6/2017	Changed Current Quantity from 100 to 50.	4/2/2017									
								4/6/2017	Changed Base Original Cost from 1,776.86 to 888.43.	4/2/2017									
								6/12/2017	Corporate Action Transaction processed for lot which changes	6/12/2017									
								6/12/2017	Corporate Action Transaction processed for lot which changes	6/12/2017									
								6/12/2017	Transaction cancelled. Revert Current Quantity from 100 to 5	6/12/2017									

Review and manage positions and tax lots from the position management dashboard.





Charles River enables sound and efficient investing across all asset classes. Investment firms in more than 40 countries use Charles River IMS to manage more than US\$25 Trillion in assets in the institutional investment, wealth management and hedge fund industries. Our Software as a Service-based solution automates and simplifies investment management on a single platform – from portfolio decision support and risk management through trading and post-trade settlement, with integrated risk and compliance throughout. Headquartered in Burlington, Massachusetts, we support clients globally with more than 750 employees in 11 regional offices.

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**Portfolio Management & Risk Analytics**  
**Order & Execution Management**  
**Compliance** || **Investment Book of Record**  
**SaaS Deployment** || **Integrated Data**