

Perspective. Passion. Impact.

Performance Integrity Controls: Practical Considerations and Uses of Data

Claude Giguere, Robust Technologies

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*Performance
Integrity Controls:
Practical
Considerations
and Uses of Data*

- **The Importance of Performance Data Integrity Controls**
- **TSG Data Quality Working Group**
- **Practical examples across Differences in Performance Data Types**
- **Performance Readiness**
- **Summation**
- **Q&A**



The Importance of Performance Data Integrity Controls

New SEC Advertising Rule goes into effect on November 4, 2022

The Securities and Exchange Commission amendments merge cash solicitation rules into the Advertising rule, creating the new “Marketing Rule” 206(4) - 1

Greater SEC attention is expected on client reported performance measurement results, and the internal data and processes that produce performance returns

January 13, 2022: SEC Charges Investment Adviser in connection with use of Back-tested Performance

A registered investment adviser, for **failing to adopt and implement policies and procedures reasonably designed to prevent false or misleading advertisements** concerning the hypothetical, back-tested performance of the firm's algorithmic strategies, and for failing to preserve certain advertisements.

<https://www.sec.gov/enforce/ia-5945-s>

Sept. 30, 2021: SEC Charges Former Executives of Registered Investment Adviser with Fraud

Multiple executives were charged with fraud in connection with a firm's scheme to **artificially inflate the net asset values and performance results** of several firm managed funds. The SEC previously charged the firm and an affiliated company, with fraud on May 11, 2020, and obtained the appointment of a receiver over those entities and the funds.

<https://www.sec.gov/news/press-release/2021-204>

*Proper **preparation** prevents
poor **performance**.*

(James Baker)

Ready for Performance Measurement and Attribution?

- **How well are you managing these common challenges?**
- ◐ Raw data accounting is usually insufficient for performance measurement
- ◐ Strategies, portfolios and client information are usually disassociated
- ◐ Voluminous market reference and investment characteristics data
- ◐ Raw index data is inadequate for meaningful performance attribution
- ◐ Historical Portfolio and Benchmark Performance Data is rarely Homogenous
- Strategies and marketing composites are typically an afterthought

PERFORMANCE INTEGRITY CONTROLS

Practical Considerations and Uses of Data

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Investment Performance Solutions

Performance Department

Bears Very Important Responsibility

Crucial to the reputation of the firm

- Calculate , Publish & Explain returns of clients' portfolios
- Task:
 - Complex
 - Requires a ton of work
 - Last line of defense before numbers go out to clients
 - No mistake is allowed

What makes the job so difficult ?

- Rely on a sheer volume of data to be
 - accurate, complete and current
- Data that
 - Do not control
 - Produced outside of your department & organization
 - Come from disparate systems
 - Not particularly designed to feed Performance Measurement applications
- Process error prone by nature

A Sea of Data

Data, data,
everywhere,

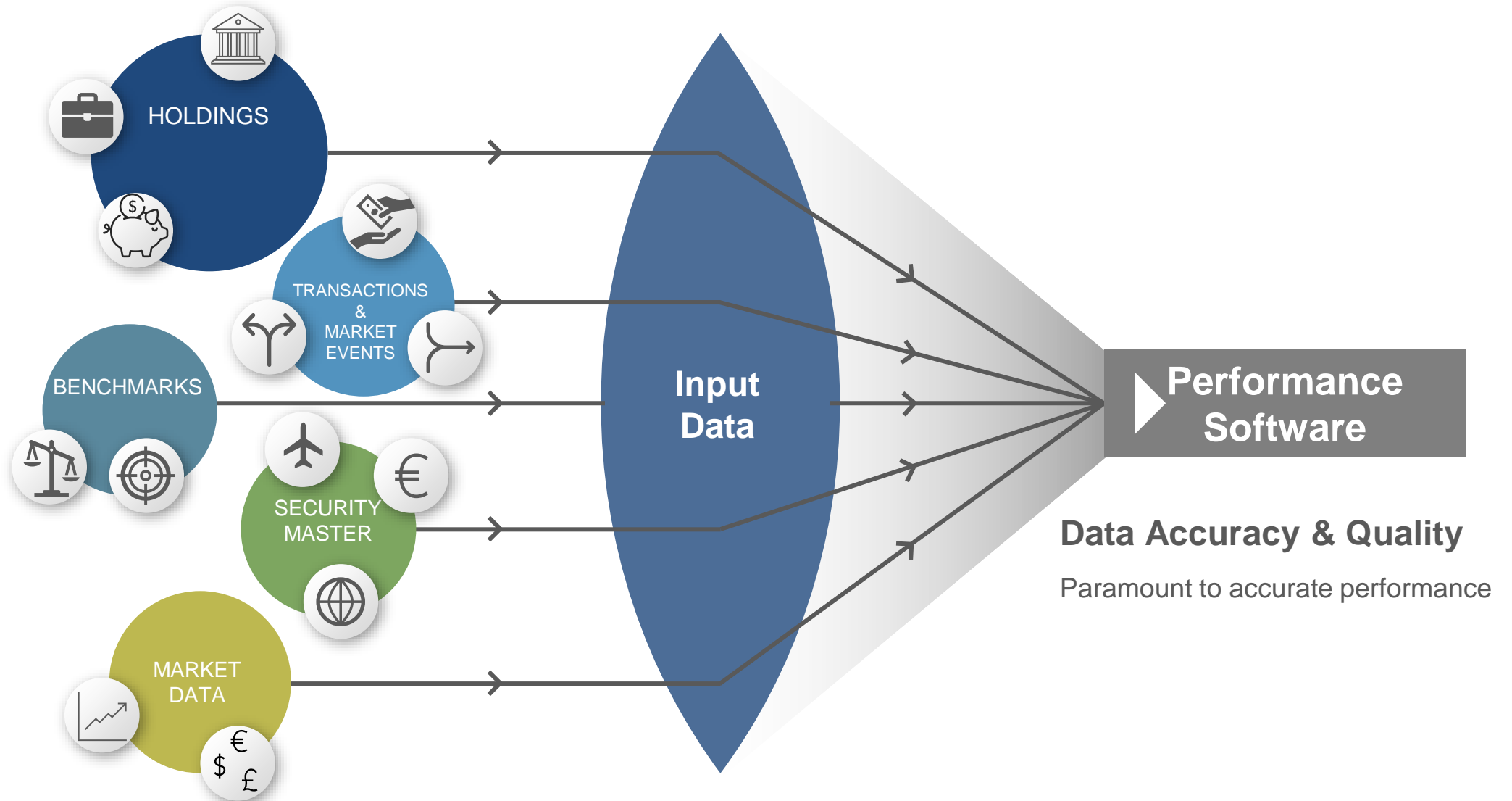


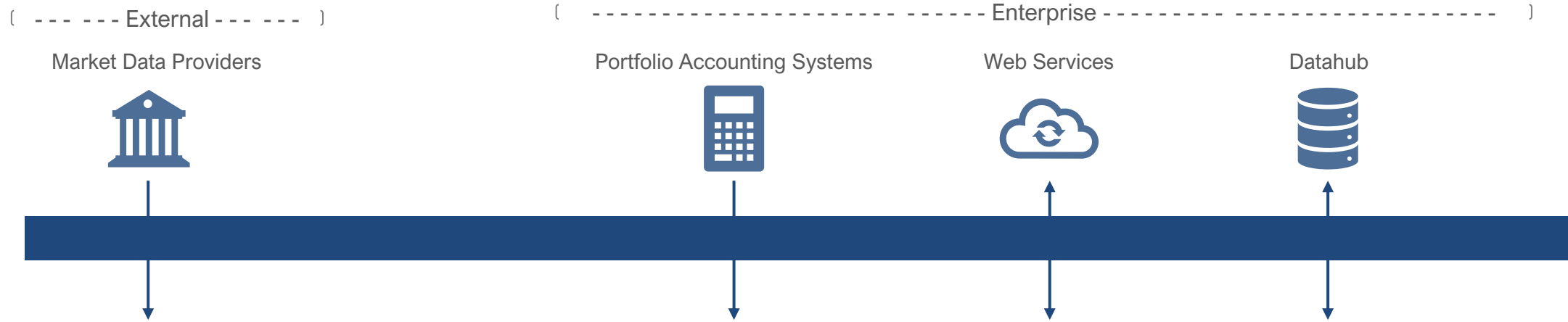
Nor any mistake
to make.

Samuel Taylor Coleridge
(1772 - 1834)



Data, data everywhere






PERFORMANCE

SOFTWARE

- ✓ Flat files : csv, pipe |
- ✓ Direct Database

Formats

- ✓ <XML>, JSON
- ✓ Datahub

THE SPAULDING GROUP
Performance Measurement Forum



Data Quality Working Group

Meetings every 3 weeks

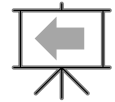
Round table
Investment Performance Professionals



4 Meetings per year
Discuss
Challenges, Trends, Solutions, Innovations
Investment Performance

Discuss
Challenges

Develop
Guidelines & Procedures



Catch and Minimize
Data Errors

Improve
Accuracy & Quality
Performance Results

PROPOSE GUIDELINE & PROCEDURES

Survey audience

We' like to get you
opinion.

**Ask if propose guideline
is..**

Worth doing ?

Yes or No

Reasonably feasible?

Yes or No



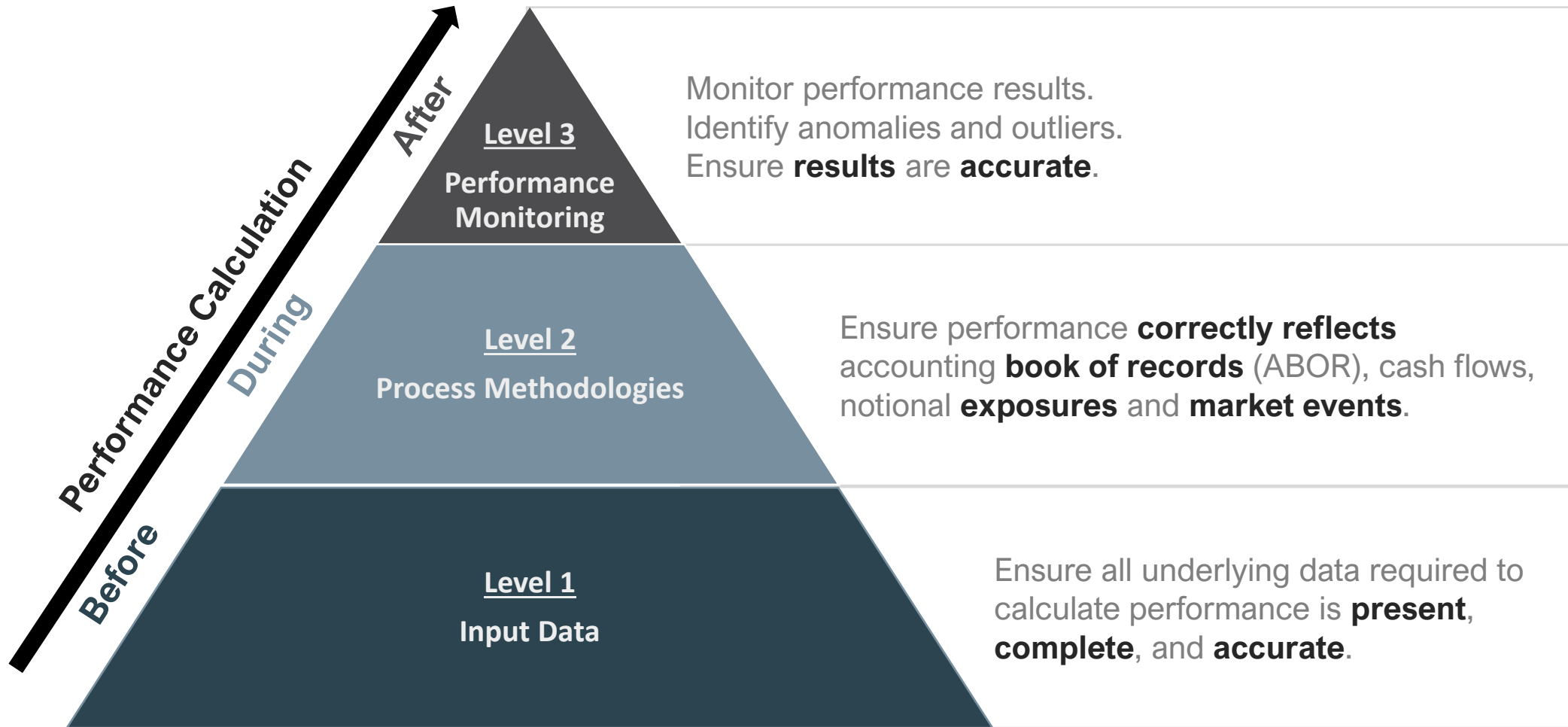
Yes



No

DATA VALIDATION

Process



POSITIONS

Evaluation days

Ensure

- Position files exist for all required days.

Outcome

- Affects day weighting of cash flows and transactions.

How

- ✓ Build array-like report highlighting missing periods.

Count of At	Column Labels																	
Row Labels	3-Feb	4-Feb	5-Feb	6-Feb	7-Feb	10-Feb	11-Feb	12-Feb	13-Feb	14-Feb	17-Feb	18-Feb	19-Feb	20-Feb	21-Feb	24-Feb	25-Feb	26-Feb
DEX22006	22	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
DEX26036	22	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
DEX26037	22	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
DEX26038	22	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
DEX26039	22	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
DEX26039-SML	22	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
DEX26041	22	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
DEX26042	22	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
DEX26043	22	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
DEX26044	22	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
DEX26045	22	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
DEX26183	22	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
DEX29095	22	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
DEX29096	22	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
DEX29097	22	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
DEX29098	22	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
DEX29099	22	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
DEX29100	22	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
DEX29101	22	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
DEX29105	22	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
HC40	23	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
JOA4H	23	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Grand Total	486	22	22	22	22	22	22	22	22	22	22	2	22	22	22	22	22	22

Considerations

- ❖ Frequency
- ❖ Weekend
- ❖ Weekend on a month-end
- ❖ Holidays

Is worth doing ?
Seems feasible?



POSITIONS

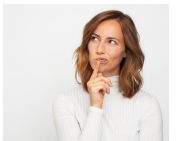
Total Portfolio Value vs Security Level Values

Ensure	Outcome	How
<ul style="list-style-type: none">Market value total portfolio = sum of securities market values	<ul style="list-style-type: none">➤ Incorrect evaluations➤ Incorrect Performance➤ Attribution residual	<ul style="list-style-type: none">✓ Provide security level positions.✓ Sum up market values.

Considerations

- Does performance application expect market values to be provided at the total portfolio level?
- Or does it always sum it from security level positions?

**Is worth doing ?
Seems feasible?**



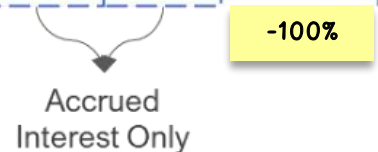
POSITIONS

Accrued Income

When a bond is sold out, the accrued income of the transaction is calculated up to the settlement date. Some portfolio accounting system shows negative accrued income in their holdings file to represent the interest that has accrued until the settlement date.

Ensure	Outcome	How
<ul style="list-style-type: none"> Accrued income on trade date basis. 	<ul style="list-style-type: none"> GIPS requirement 	<ul style="list-style-type: none"> ✓ Distinguish accrued income from market values in input file.
<ul style="list-style-type: none"> Accrued income on closed positions continues until settlement. 	<ul style="list-style-type: none"> Return not calculable at security level 	<ul style="list-style-type: none"> ✓ Calculates contribution and \$ Earned. ✓ Return not reported when only income.

Sec Id	Issuer	Issue	Invested First	Invested Last	Units Begin	Units End	Begin Market Value	End Market Value	Cash Flows	\$ Earned	TW Contribution	Time Weighted Return
06369ZCC6	BANK OF MONTREAL	3.32 JUN 01 26	1-May-20	1-May-20	35,000,000	20,000,000	35,976,108	20,554,258	-15,420,294	-1,557	-0.00003%	-0.00%
06369ZCC6	BANK OF MONTREAL	3.32 JUN 01 26	2-May-20	4-May-20	20,000,000	10,000,000	20,554,258	10,277,603	-10,277,305	651	0.00001%	0.00%
06369ZCC6	BANK OF MONTREAL	3.32 JUN 01 26	5-May-20	5-May-20	10,000,000	10,000,000	10,277,603	10,279,386	-	1,784	0.00004%	0.02%
06369ZCC6	BANK OF MONTREAL	3.32 JUN 01 26	6-May-20	6-May-20	10,000,000	-	10,279,386	-1,819	-10,284,025	-2,819	0.00006%	-0.03%
06369ZCC6	BANK OF MONTREAL	3.32 JUN 01 26	7-May-20	7-May-20	-	-	-1,819	-910	-	910	0.00002%	-
06369ZCC6	BANK OF MONTREAL	3.32 JUN 01 26	8-May-20	8-May-20	-	-	-910	-	-	910	0.00002%	-



Is worth doing ?
Seems feasible?



TRANSACTIONS

Transaction Code Mapping

Thousands of transaction codes translate to a handful of performance transaction flows. New codes can be introduced anytime.

Ensure

- All transaction codes are correctly mapped.

How

- ✓ Monitor and identifying new transactions codes.
- ✓ Soft map transaction codes, so no software modification required.



TRANSACTIONS

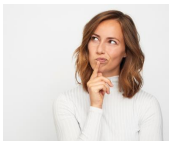
Reconcile with positions

It's possible that the transactions and positions files be out of sync if extracted from the portfolio accounting system at different times

Ensure	How
▪ Holdings positions are in sync with transactions.	✓ Reconcile the positions at end of day against positions of previous day plus transactions during the day.

$$Share^{Today} = Share^{Yesterday} \pm Transactions$$

**Is worth doing ?
Seems feasible?**



TRANSACTIONS

Reconcile with Cash Positions

Reconciling cash balances is also a good way to ensure positions are in sync with the transactions.

Ensure

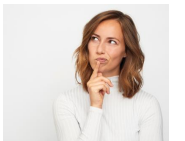
- Cash balance positions are in sync with transactions.

How

- ✓ Reconcile cash balances (per settlement currencies) at end of day against previous day plus the transactions of the day.

$$Cash_{USD}^{Today} = Cash_{USD}^{Yesterday} \pm Transactions$$

**Is worth doing ?
Seems feasible?**



TRANSACTIONS

Reconcile Variation Margins of Futures Positions

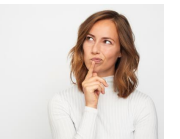
Reconciling variation margin is a good way to ensure futures positions are in sync with the transactions.

Ensure	How
▪ Futures positions and variation margins are in sync P&L that are marked-to-market daily.	✓ Reconcile margin balances at the end of each day = variation margin balances of the previous day +/- the futures P&L of the day

$$\text{Margin}_{USD}^{\text{Today}} = \text{Margin}_{USD}^{\text{Yesterday}} \pm \text{FuturesP\&L}$$

Portfolio	Begin Date	End Date	Security Id	Issuer	CHECK	Begin Value	FLOW	Ending Value	Difference
PF1	1/1/2022	1/3/2022	CASHCA	CASH - CA	LocalCashFlow	338,991.44	-	83,507.90	(255,483.54)
PF1	1/1/2022	1/3/2022	880789AD4	TERANET INC	UnitCount	4,476,607.00	-	4,478,211.00	1,604.00
PF1	1/5/2022	1/5/2022	MARGINCA	CASH MARGIN	LocalCashFlow	2,018,641.54	(697,500.00)	1,320,652.12	(489.42)

Is worth doing ?
Seems feasible?



TRANSACTIONS

Corrections

Transactions are most likely to be corrected between their trade and settlement dates but can occur later before the month is closed.

Ensure	How
<ul style="list-style-type: none">▪ All transaction corrections are reflected in the performance results.	<ul style="list-style-type: none">✓ Reloading systematically holdings and transactions for the past 3 days.✓ At month end, when the portfolio accounting books are closed, reload holdings and transactions for every day of the month.✓ Then close performance records
<ul style="list-style-type: none">▪ Back dated correction are processed across all portfolios	<ul style="list-style-type: none">✓ Record of backdated pricing adjustments and their impact on reported performance should be retained in accordance with regulatory requirements so that firms can substantiate all reported performance. This may take the form of an audit trail.

Other considerations

- Closed periods
- Transaction correction with effective date

**Is worth doing ?
Seems feasible?**



TRANSACTIONS

External Cash flow timing assumption

Timing of external cash flows have impact on return of portfolio.

External cash flows = exogenous; originating from outside the portfolio. Cash Deposit / Withdrawal

Ensure

- Reflect when the money is available to invest.

How

- ✓ Define rules to establish cash flow assumptions.

	Deposit		Withdrawal	
	Begin	End	Begin	End
MV0	200	200	200	200
CF	100	100	-110	-110
MV1	330	330	110	110
Num	30	30	20	20
Beg/End Day	BOD	EOD	BOD	EOD
F	1	0	1	0
WCF	100	0	-110	0
Denom	300	200	90	200
ROR	10%	15%	22%	10%

Is worth doing ?
Seems feasible?



TRANSACTIONS

Internal Cash flow timing assumption

Timing of internal cash flows have impact on return of the securities, sectors and asset classes. E.g. purchase and sales assumed at the begin vs end of day.

Ensure

- Reflect proper timing of transactions.

How

- ✓ Purchase BOD, Sale EOD
- ✓ Ensure net weighted flow = 0

	Purchase		Sale		Purchase		Sale	
	Begin	End	Begin	End	Begin	End	Begin	End
MV0	0	0	100	100	100	100	200	200
CF	100	100	-110	-110	100	100	-220	-220
MV1	110	110	0	0	220	220	0	0
Num	10	10	10	10	20	20	20	20
F	1	0	1	0	1	0	1	0
WCF	100	0	-110	0	100	0	-220	0
Denom	100	0	-10	100	200	100	-20	200
ROR	10%	#DIV/0!	-100%	10%	10%	20%	-100%	10%
Contrib	2.0%	2.0%	2.0%	2.0%	4.0%	4.0%	4.0%	4.0%

Portfolio value = 500

-100%

Is worth doing ?
Seems feasible?



EXCHANGE RATES

Positions & Transactions

Ensure	How
<ul style="list-style-type: none">▪ Market values of foreign securities converted to home base currency at correct FX rate.	<ul style="list-style-type: none">✓ Load local (foreign) and base (home) values✓ Infer implicit FX rates.
<ul style="list-style-type: none">▪ FX rates consistent across portfolios.	<ul style="list-style-type: none">✓ Compare implicit FX rates across portfolios.
<ul style="list-style-type: none">▪ FX rates consistent across securities (within portfolio).	<ul style="list-style-type: none">✓ Compare implicit FX rates across securities within portfolios.
<ul style="list-style-type: none">▪ FX rates consistent with benchmark	<ul style="list-style-type: none">✓ Compare implicit FX rates against benchmark.

Considerations

- Multiple FX rate sources.
- Priority ranking
- Internal analysis / attribution

**Is worth doing ?
Seems feasible?**



SECURITY PRICING

Consistent across portfolios

Ensure security prices

- Exist for all securities.
- Exist on all business days
- Reflect current market prices.
- Consistent across portfolios

How

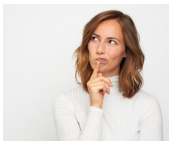
- ✓ Inventory securities actively held in portfolios.
 - ✓ Validate prices exist for all securities (on any given day)
 - ✓ Validate prices exist for all business days.
 - ✓ Validate security prices changed from day to day.
 - ✓ Compare securities price across portfolios.
-



SECURITY PRICING

Consistent vs Benchmarks

Ensure	How
<ul style="list-style-type: none">▪ Security prices are consistent with benchmark	✓ Infer and compare security prices between portfolio and benchmark. Identify acceptable threshold.
<ul style="list-style-type: none">▪ Identify impact of different price sources between portfolio vs benchmark	✓ Calculate model portfolio using benchmark prices.
<ul style="list-style-type: none">▪ Support for multiple price sources	✓ Implement price sources hierarchy



PERFORMANCE MONITORING

Identify Outliers

Comparing returns across accounts and benchmark is a good way to identify anomalies. Returns can be monitored at all levels such as total portfolio, asset classes, sectors and securities.

Ensure	How
<ul style="list-style-type: none">▪ Accounts performance consistent<ul style="list-style-type: none">○ Peer accounts○ Benchmark	<ul style="list-style-type: none">✓ Identify outliers in peer accounts (Composites)✓ Performance attribution against<ul style="list-style-type: none">○ Other accounts○ Model account○ Benchmark
<ul style="list-style-type: none">▪ Securities performance consistent<ul style="list-style-type: none">○ Peer accounts○ Benchmark	<ul style="list-style-type: none">✓ Identify security level return outliers across peer accounts.✓ Security Level Attribution against<ul style="list-style-type: none">○ Other accounts○ Model account○ Benchmark✓ Isolate pricing source difference from security selection.

**Is worth doing ?
Seems feasible?**



OTHER TOPICS DISCUSSED

Topic	Ensure
▪ Data file integrity	✓ Record counts actual versus declared (header/trailer record) ✓ Actual date of records versus declared.
▪ Contemporary data.	✓ Verify dates of records are contemporary (recent) unless loading historical data.
▪ Security classification	✓ E.g. sector change. Monitor security classifications
▪ Security master information	✓ Monitor 3 rd party data metrics
▪ Derivative instruments <ul style="list-style-type: none">○ Exchange trader, OTC's	✓ Notional exposure, marked-to-market, variation margins ✓ Metrics: multiplier, price, delta
▪ Look-through	✓ Disclose exposures pooled funds, ETF, Futures
▪ Illiquid assets	✓ Ensure security prices are reflecting fair market values
▪ Private equities, Real assets	✓ 3 months lag evaluation

THE
SPAULDING
GROUP
Data Quality Working Group

We're still working on it!

And we welcome your

Suggestions and Comments

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Performance Readiness

Risks surround Performance

- Enormous risk mis-reporting performance
- Exposure to negative reputational risks
- Loss of client trust
- Resource intense operations risks
- Limited risk mitigation options thru outsourcing

A Performance Data Readiness Framework is a clear necessity for reliable returns

- Prepare with honest Planning and Resource Alignment
- Assess Data Readiness for Target State Performance
- Historical Portfolio and Benchmark Performance Data Challenges

Simplified Project Framework Example

01



PLANNING

- Establish a steering committee
- Identify project leads
- Define target operating model
- Confirm success criteria
- Prioritize new requests
- Establish change processes
- Define project team needs

02



HISTORICAL DATA SOURCE ANALYSIS

- Review legacy architecture, data production, and stores.
- Legacy data assessments
- Confirm methodologies and other key characteristics for derived data
- Inventories, data dictionary, Usage, Source to target, etc.

03



CONFIGURATION , LOAD AND INITIAL CHECK OUT

- Reference data alignment
- Static data sourcing: account masters, composites, calendars, conventions, etc.
- Load and validate on a representative accounts (POC)
- Validate expected results, triage and identify remediations

04



LEGACY TO TARGET MODEL RECON AND APPROVAL

- Automate the comparison process via accelerators
- Classify issue based on standard reason codes
- Derive patterns of errors to address root causes
- Control point-based approval process over final data

Target Operating Model

Project Timeline and Status Updates

Planning Considerations

- History Conversion should be its own workstream, separate from system implementation
- Separate budget and dedicated team
- Communication and managing expectations are key
- Perform cost-benefit analysis for each regime (points in time where material changes to calculation approaches occur)
- Establish thresholds/ranges for critical performance data elements to determine priority of issues.

Determine Scope & Success Criteria

- Define MVP, Interim States and Target State Models
- More frequent periodicity can complicate and delay the project exponentially
- Determine periodicity of returns (e.g. 10 years' worth of monthly returns or will annual returns suffice?)
- Consider regulatory requirements for data retention as well as marketing needs
- Based on specifics of conversion data, evaluate different scenarios and assign cost to each one

Historical Data is never homogenous

- Identify data timeframe regimes back to inception
- Establish a sequencing approach tailored to the specific needs of the project
- Perform beta testing on new system to identify best way to bring over history
- Avoid backfilling historical accounting input to recalculate results in a new system
- Security cross-referencing issues cause havoc in performance conversions
- Methodology differences could cause variance in net returns between old and new systems

Meradia Recommends a Performance Data Readiness Assessment

PDRA reduces surprises and increases the accuracy of project planning

- **New capabilities** New and often unproven data sources
- **Update operating models** More analytics or move from regional to global cycle
- **Improved efficiency** Process automation and dynamic data quality checks

What is involved in a PDRA?

- 1) Clarify program aims
- 2) Assess data flows for key inputs and outputs of the calculation process
- 3) Identify and determine riskiness of key work-arounds
- 4) Solution design
- 5) Remediate
- 6) Informed collaboration with project planning framework



Conclusion

*Before anything else,
preparation is the key to
success.*

(Alexander Graham Bell)



Q&A

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We're still working on it!

And we welcome your

Suggestions and Comments

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