


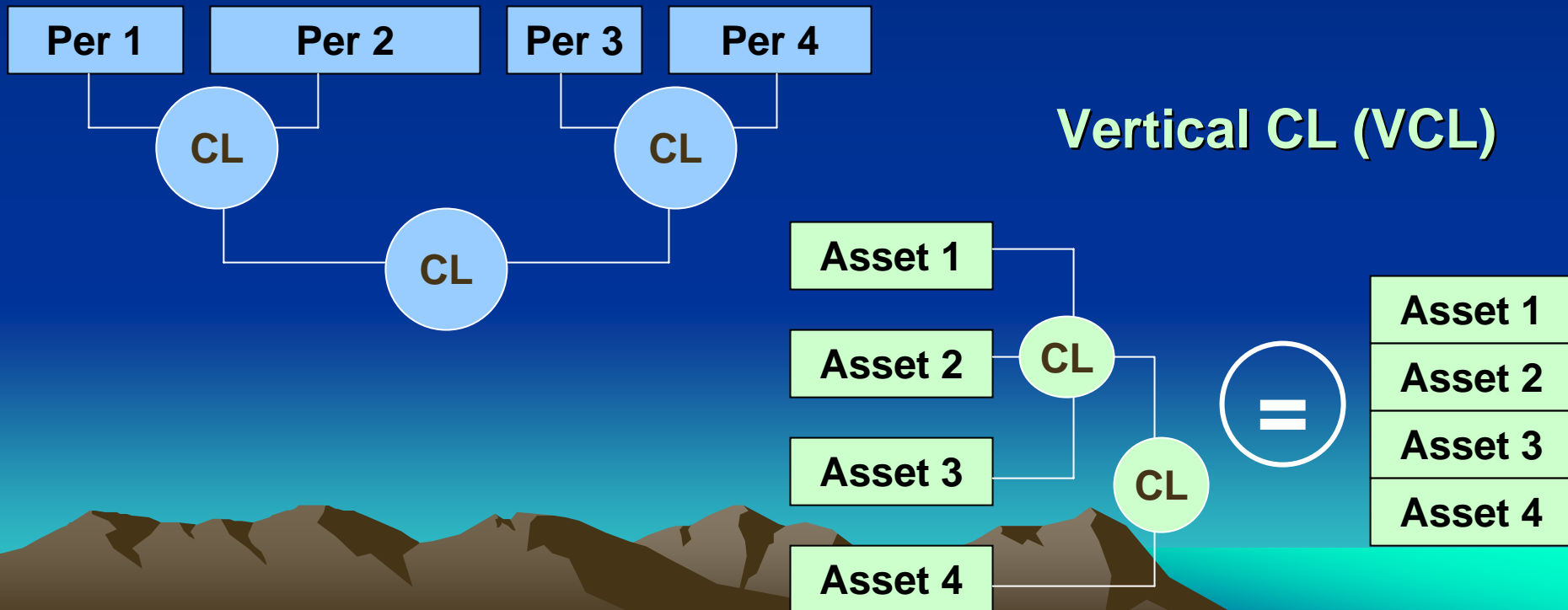
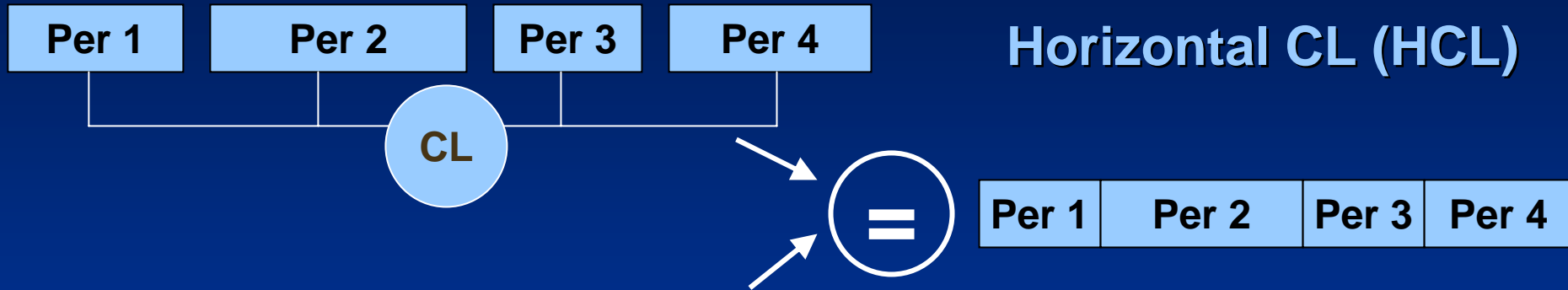
CONSISTENT LINKING METHOD FOR INVESTMENT PERFORMANCE MEASUREMENT

*Presentation by SegmentSoft, based on recent publications
and advanced computational research*

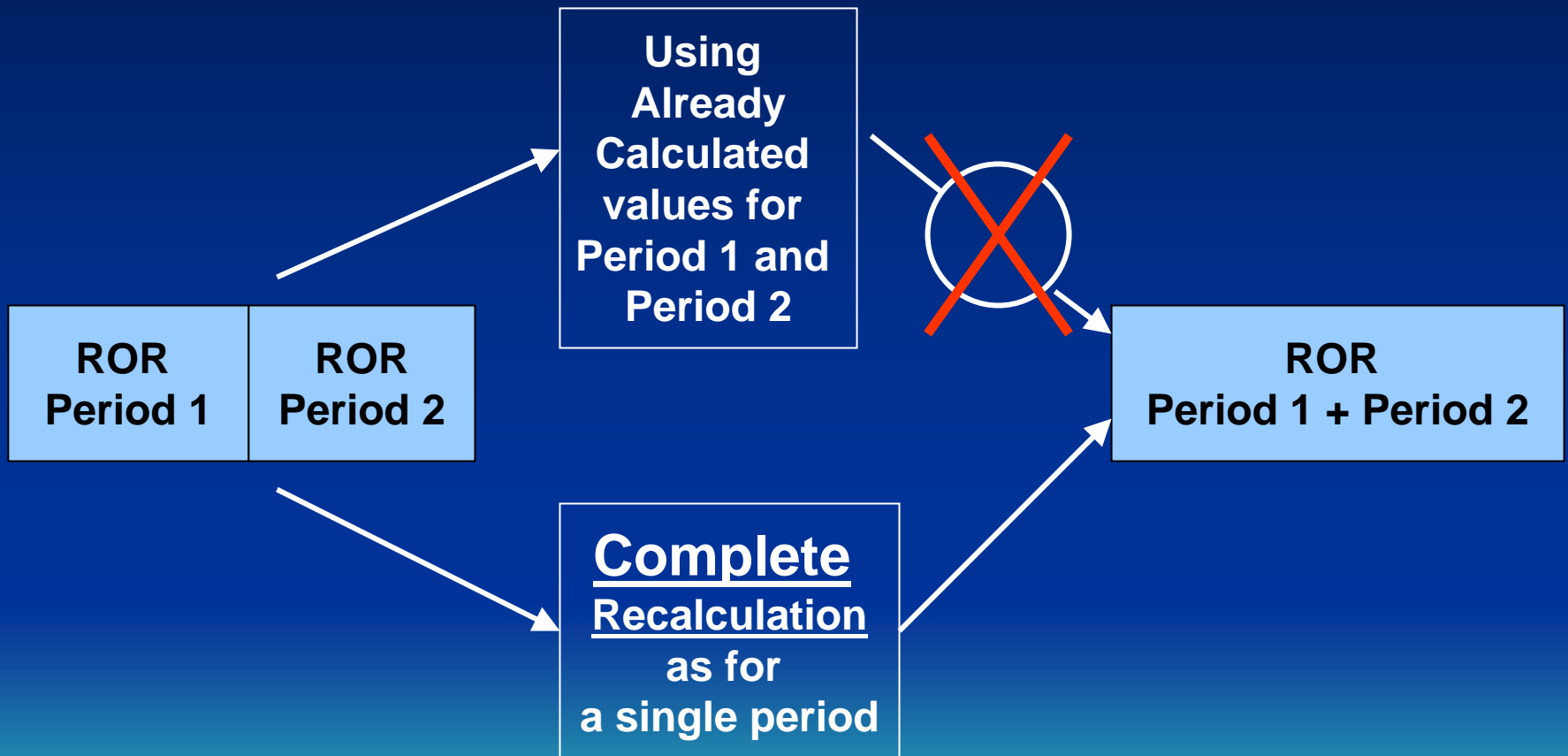
Tel. 416-631-7293 E-mail: ys@segmentsoft.com

- Simple, precise and real time investment performance measurement
 - Making investment analysis much more revealing and efficient
 - Developing optimized investment and trading strategies and avoiding losses using real time monitoring
- 

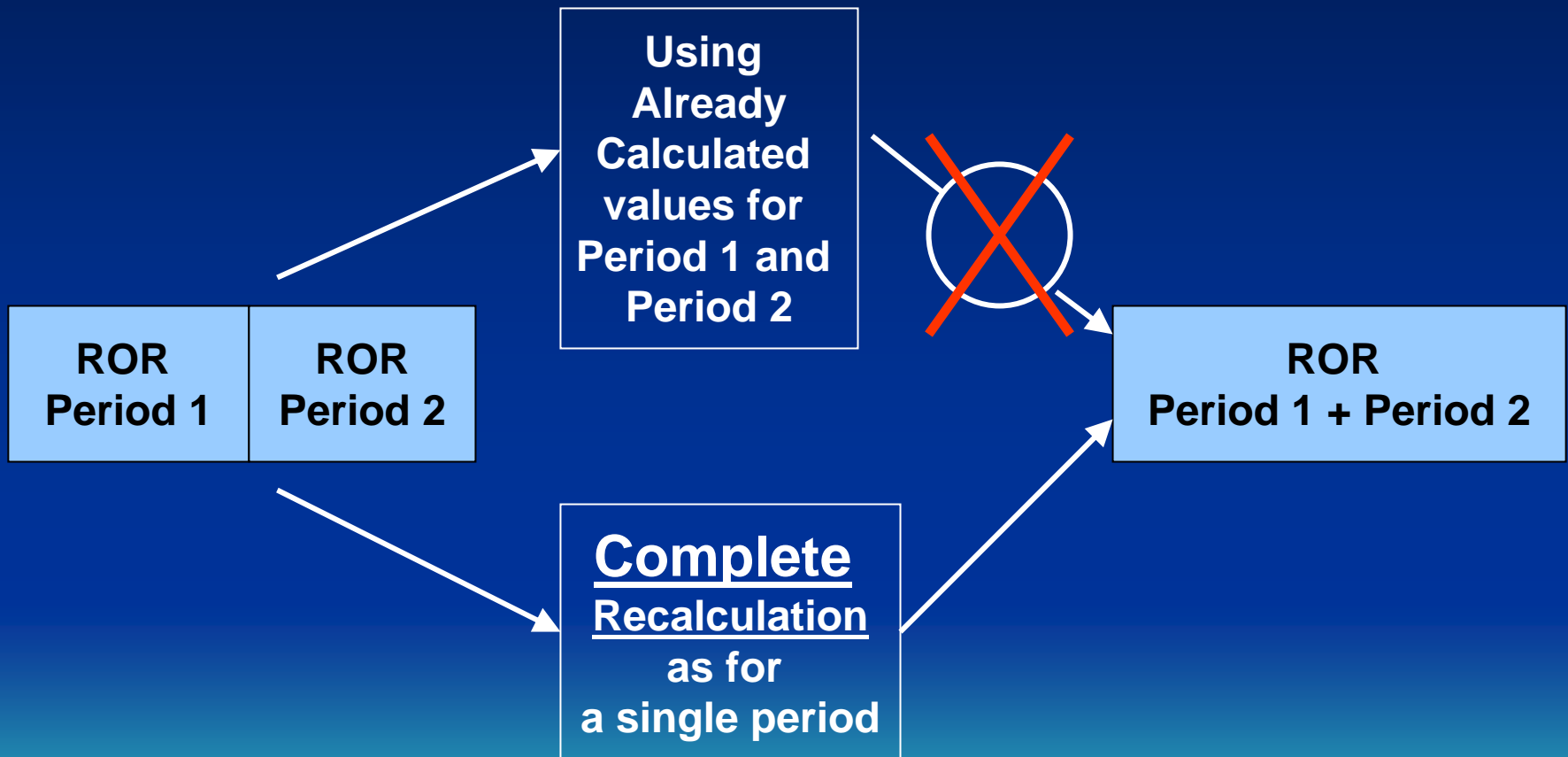
Consistent Linking Method (CL)



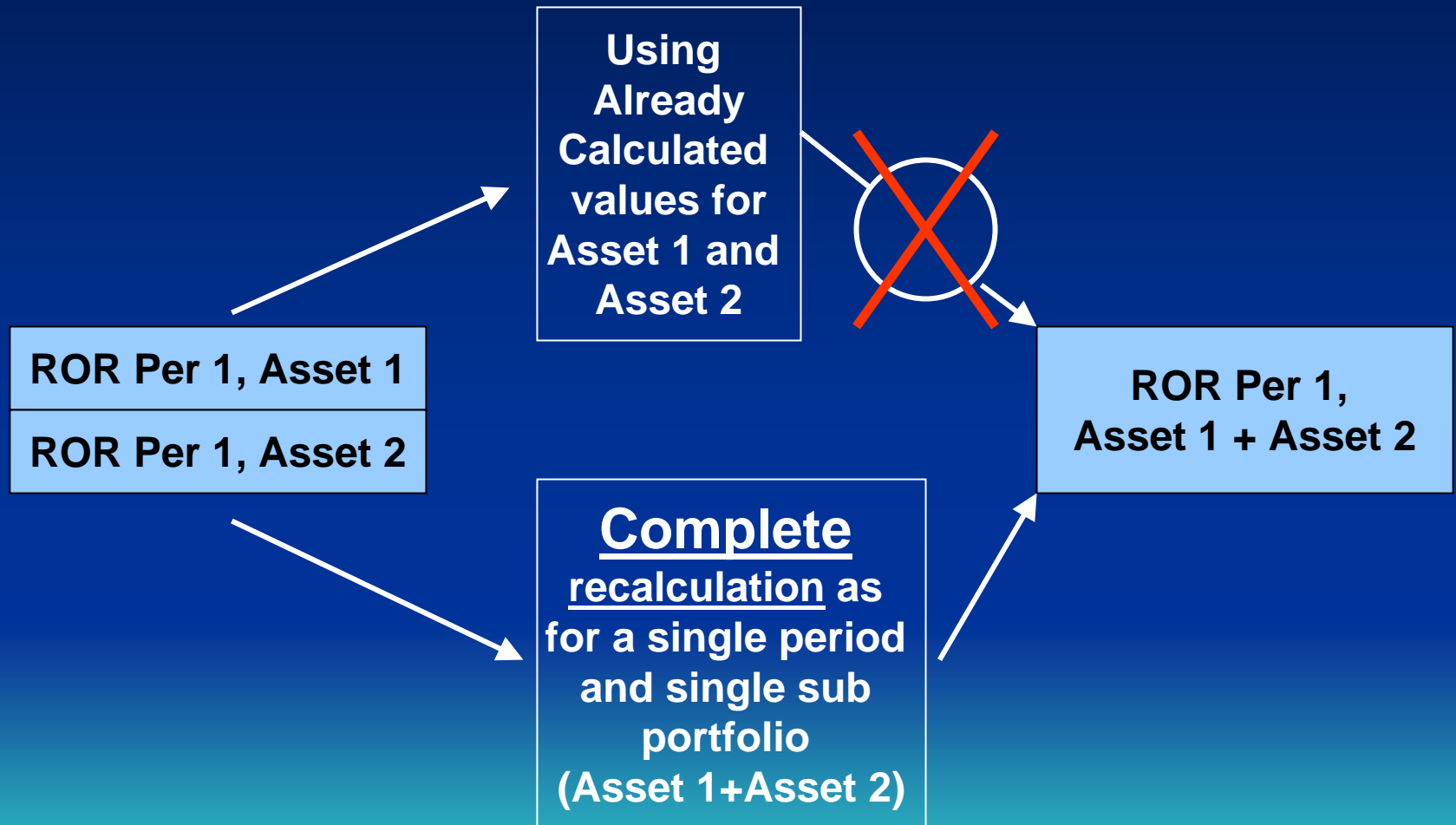
Limitations of Existing Methods



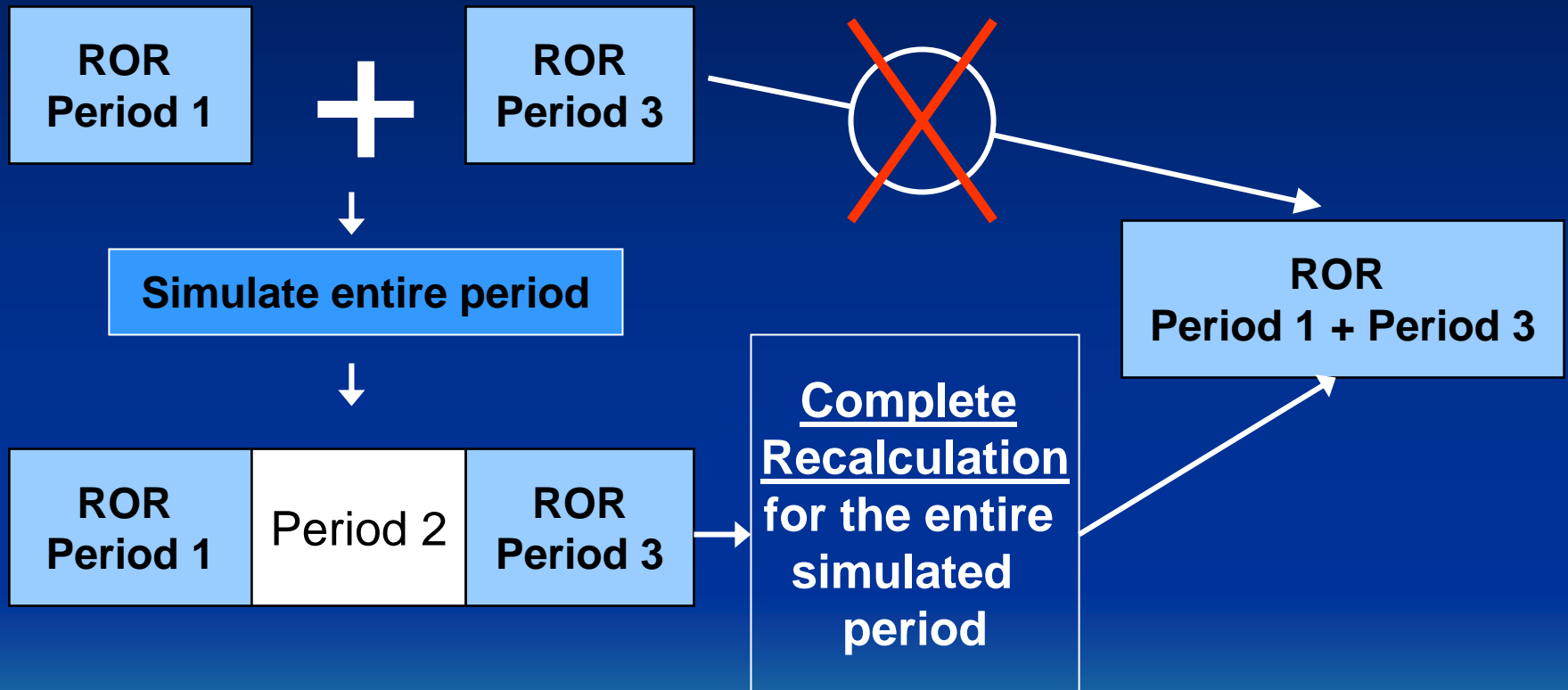
Limitations of Existing Methods



Limitations of Existing Methods



Limitations of Existing Methods



Same simulation is needed for different asset types taken either for the same or different periods

Limitations of Existing Methods

Universe (Huge Database of returns for different combinations of periods and assets)

Holds all previously computed Rates of Return for *ALL* combinations of assets and periods because of very intensive and time consuming calculations (night batch jobs)

ROR Asset 1,
Period 1

ROR Asset 1,
Period 2

ROR Asset 1,
Period 1+Period 2

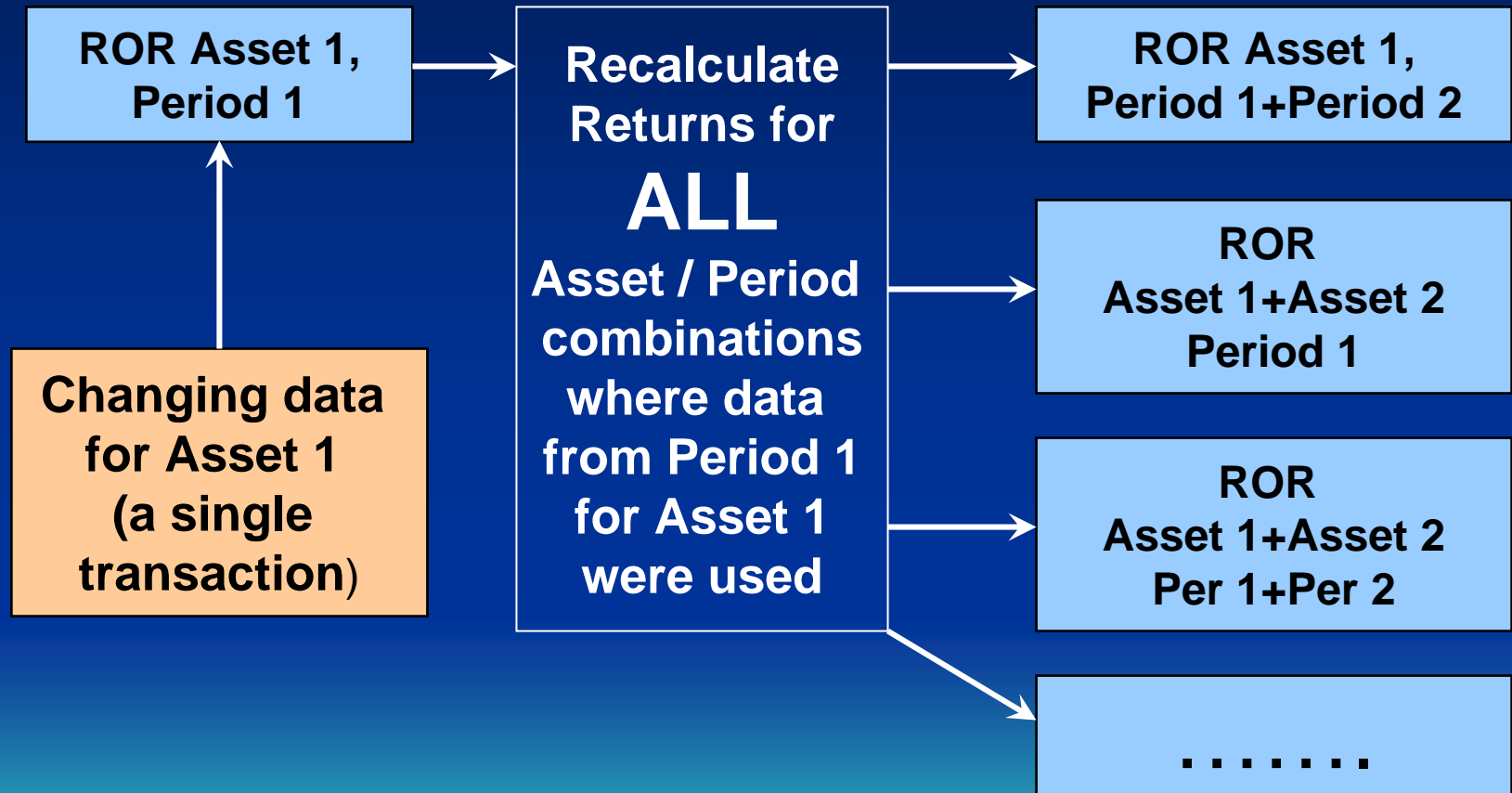
ROR Asset 2,
Period 1

ROR Asset 2,
Period 2

ROR
Asset 1+Asset 2
Period 1



Limitations of Existing Methods



Limitations of Existing Methods

- Rigid and restrictive analytical scenarios available to Analysts
- **Computationally very intensive and time consuming calculations**
- Slow performance for daily computations done by Analysts in research process
- **Huge Database size**
- Even if a bit of data is changed, then ALL returns must be recalculated where this bit of data was used



Consistent Linking Method (CL)

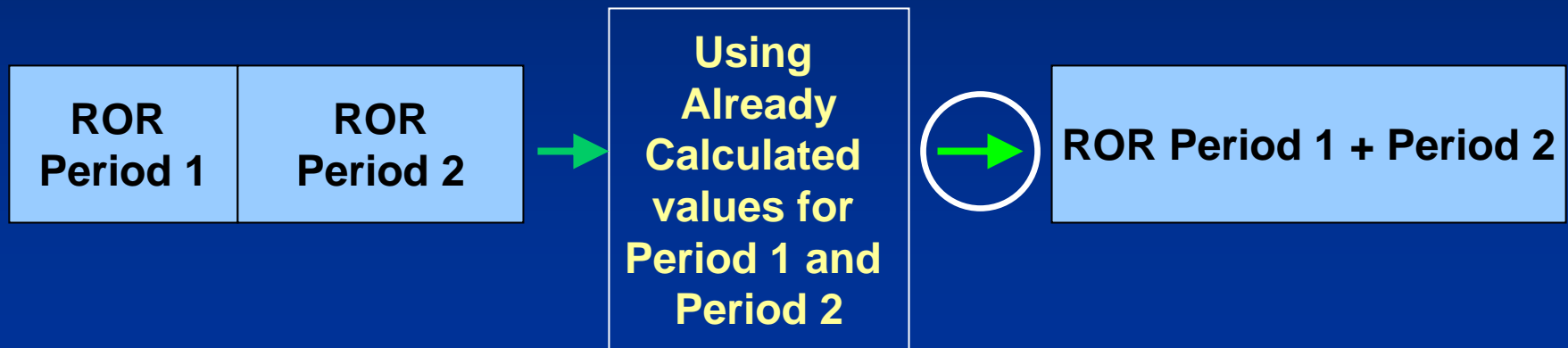
New Depths in Performance Management and Investment Analysis

- CL for Time Weighted Rate of Return (TWRR) produces **precise** value
- CL for Internal Rate of Return (Money Weighted Rate of Return) – **approximate** value with **predefined by user accuracy**.



Consistent Linking Method

ROR and three integral values are calculated only **ONCE** per period and then are used for **ANY** combination of periods and assets where this ROR is included



Any composite combination of assets and periods is calculated instantly, *in a real time* on the fly from returns for chosen base periods / asset combinations

Consistent Linking Method

Per 1, ROR Asset 1
Per 1, ROR Asset 2

Using
Already
Calculated
values for
Asset
types
and
different
periods

Per 1, ROR
Asset 1 + Asset 2

ROR
Period 1

+

ROR
Period 3

ROR
Period 1 + Period 3



Consistent Linking Method

ROR Asset 1,
Period 1



Changing data
for Asset or
Period



Present
Methods
Data

Consistent
Linking
Data



Absolutely no consequences
for the rest of already
calculated returns for different
periods and assets because
composite returns are
calculated on the fly using
tiny amount of data
compared to complete
transactional info used today

Consistent Linking Method

Numerical Example

	Period 1	Period 2	Period 3	Total ROR Using CL
Asset 1	1.77865612	0.22468793	0.0767590	2.4141176
Asset 2	-0.09836065	-0.2833675	0.0272108	-0.3270440
Asset 3	0.35294117	0.08759124	0.5703422	1.3469387
Total Portfolio	0.62730627	0.03238866	0.1425091	0.8281631
Accumulated return for the total portfolio	0.62730627 Period 1	0.625210084 Period 1 + Period 2	0.8281631 Period 1 + Period 2 + Period 3	

The diagram illustrates the flow of data in the Consistent Linking Method. Green arrows show the following connections:

- Horizontal arrows from the Period 1, 2, and 3 columns of each asset row to the Total ROR Using CL column.
- Vertical arrows from the Total ROR Using CL column of each asset row to the Total Portfolio row.
- A horizontal arrow from the Total Portfolio row to the Accumulated return for the total portfolio row.
- Vertical arrows from the Total Portfolio row to the Accumulated return for the total portfolio row.

CL Performance

```
C:\Dev\IntRR\Debug>intrr.exe 1000000
PERIOD: 3
m_tBeg=Date: 03Mar2004 Time: 00:00:00
m_tEnd=Date: 02Apr2004 Time: 23:59:59

m_dMD=0.563275901
m_dIRR=0.5640679286
m_dTLin=0.5640679275

m_dMD_CT=57.48387097
m_dMD_C=37
m_dMD_C1sTR=69.37927921
m_dIRR_CTRp1sRTm1=31.17450324
m_dIRR_Cp1sRT=68.74565708
m_dIRR_CTp1sRTm1=55.26728547

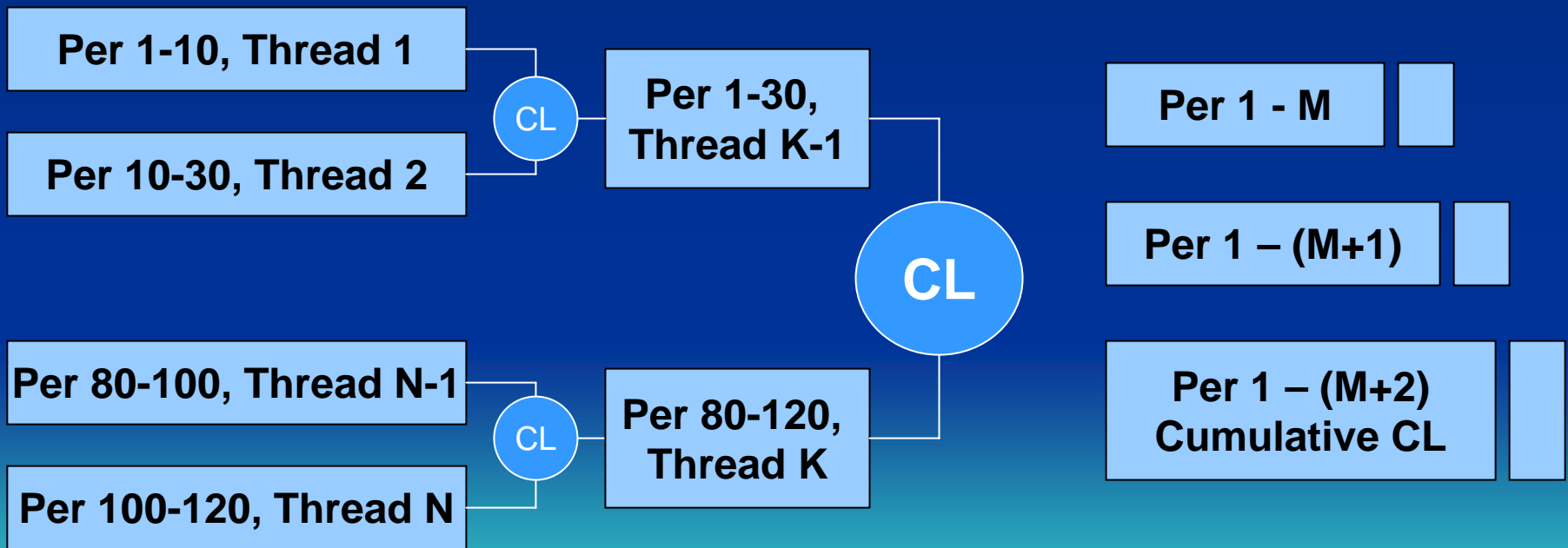
ROR produced by CL is 2.464642834
CL Calculations were done
for 1,000,000 periods
Elapsed time is 0.75 sec
```

Direct calculation:

On the same computer
calculation of
1,000,000 IRR takes
192.238 sec

Consistent Linking Method

CL *perfectly* serves parallel computing, implemented either via multithreaded design, multiple processes or exploiting multiple computers

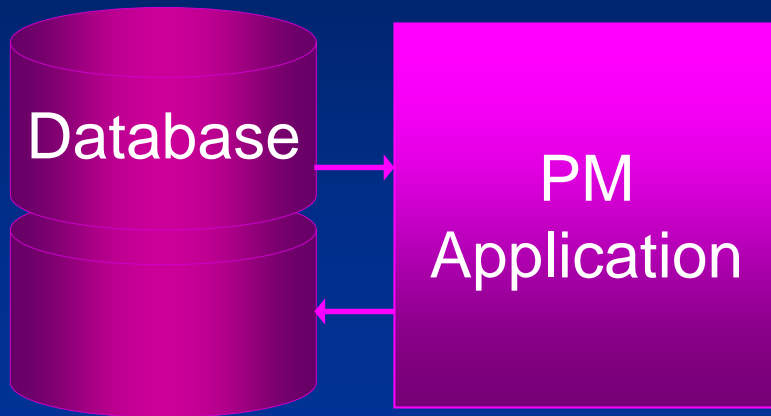


Consistent Linking Advantages

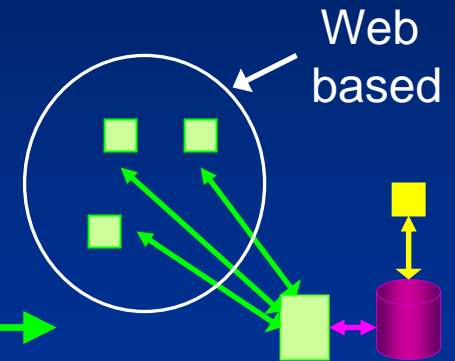
Existing Approach

Consistent Linking

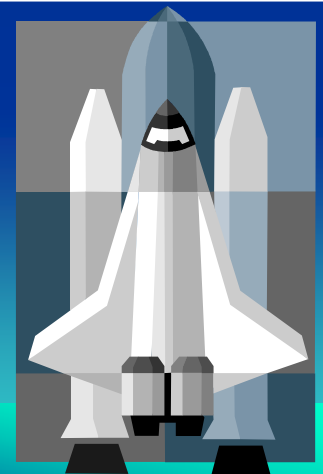
Application Design



Small database
Compact application
Distributed design
Internet based

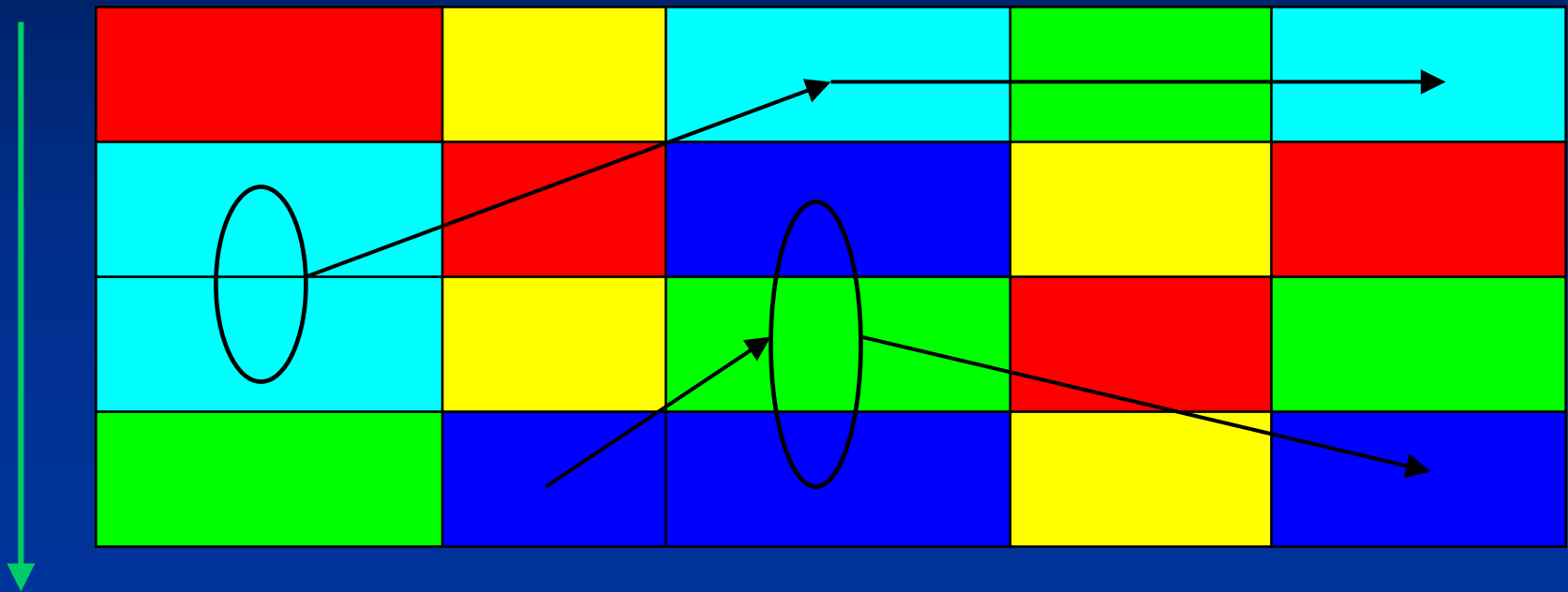


Real Time Performance



Consistent Linking Method

Periods 



Assets

Consistent Linking of arbitrary chosen asset types and periods with different length



Currently used methods DO NOT provide such **EXTREMELY BENEFICIAL** flexibility



Consistent Linking Features

- Extremely flexible analytical scenarios available to Analysts
- ***Real time computation***
- Simple, computationally very efficient and compact implementation of PM software applications
- ***Real time performance*** for daily computations done by Analysts in research process
- Compact and simple Database
- ***No data recalculation*** is required for the rest of returns if data were changed for one period
- Distributed LAN or Internet computing



New Horizons and Territories

- **NEW ADVANCED ANALYTICAL RESEARCH**
- **MATHEMATICAL OPTIMIZATION
of Investment Portfolios & Trading Strategies**
- **REAL TIME MONITORING
of complex Investment & Trading positions**
- **DEVELOPMENT OF NEW INVESTMENT &
TRADING STRATEGIES**



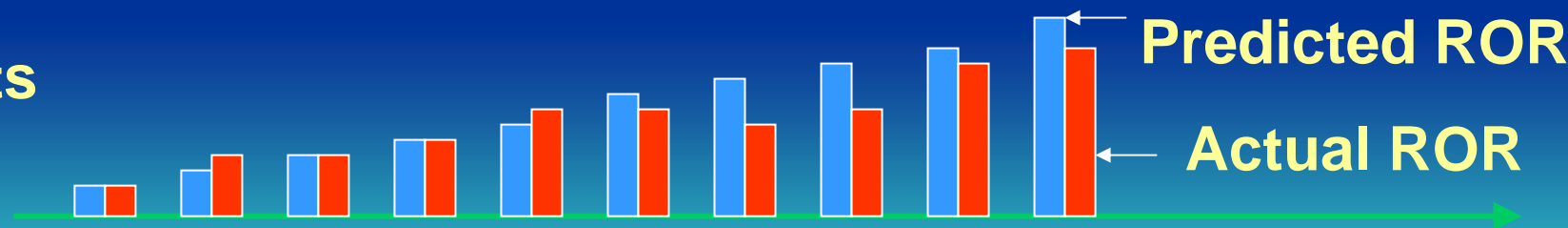
NEW ADVANCED RESEARCH

Periods 

Sec 1, Weight 1, Per 1	Sec 4, W 5	Sec 1, W 6 Per 3		
Sec 2, Weight 2, Per 1		Sec 5, W 7 Per 3		
Sec 3, Weight 3, Per 1		Sec 3, W 8 Per 3		
Sec 3, Weight 4, Per 1		Sec 5, W 9 Per 3		



Assets



Predicted ROR

Actual ROR



MATHEMATICAL OPTIMIZATION

- Type of financial instruments and position (stock, bonds, options, futures, short, long)
- Size of position
- Positions' entry and exit points
- Optimization of stop-loss and trailing stops per asset or asset group
- Correlation of groups and individual securities
- Statistical and probabilistic parameters



DEVELOPMENT OF NEW INVESTMENT & TRADING STRATEGIES

- Multidimensional parameterization space
- Combination of short term and long term indicators
- Stochastic mathematical model
- Variable entry and exit strategies
- Applicable to wide variety of financial instruments





Thank You!