



Alpha Quantum Risk Management

Alpha Quantum

Quantitative. Innovative. Robust. Researched.
Alpha.

The Alpha Quantum Way.



Our solutions

Portfolio Optimiser, Risk Management, Security Analyser, News Analytics

Alpha Quantum Risk Management

- Alpha Quantum Risk Management is a risk management solution for a wide variety of companies in financial services industry:
 - mutual funds,
 - hedge funds,
 - wealth managers,
 - insurance companies,
 - pension funds.
- Our solution allows clients to conduct risk analysis through different Value at Risk methods, construction of stress test scenarios, support for derivative positions, pre-trade risk management and risk attribution.
- The features also include limits monitoring, performance measurement, regulatory compliance and powerful reporting capabilities for credit risk, market risk and portfolio analysis.

Features

Value at Risk



- Value at Risk (VaR), CVaR, Maximum Drawdown, CDaR
- Normal distribution, non-normal distribution (t-Student and Cornish Fisher expansion)
- Historical, variance-covariance and Monte Carlo simulation
- RMT (Random matrix theory) construction of correlation matrix

Stress testing



- Historical and custom scenarios
- Stress test with changed correlations
- Support for majority of financial variables
- Reverse stress testing
- Identification of specific risk drivers for extreme losses

Risk attribution



- Marginal, component VaR
- Contribution to total VaR of portfolio: individual securities, asset classes, currencies, countries, sectors, credit risk and liquidity
- Time dependency, analysis and coupling to performance attribution
- Monitoring of active bets against benchmark

Pre-trade



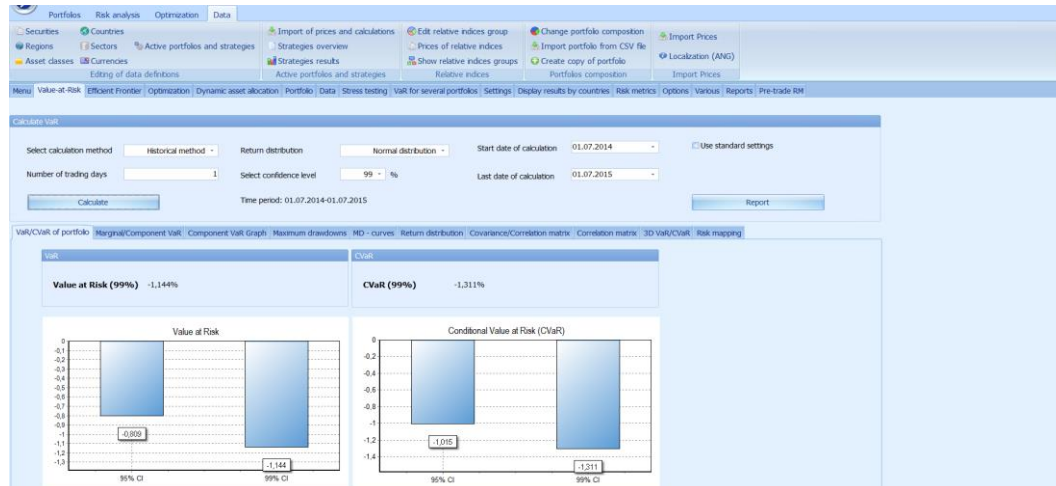
- Internal compliance function
- Analysis of risk impact of trades prior to their execution
- Limits monitoring for total VaR of portfolio as well as individual categories like sectors and countries

Performance

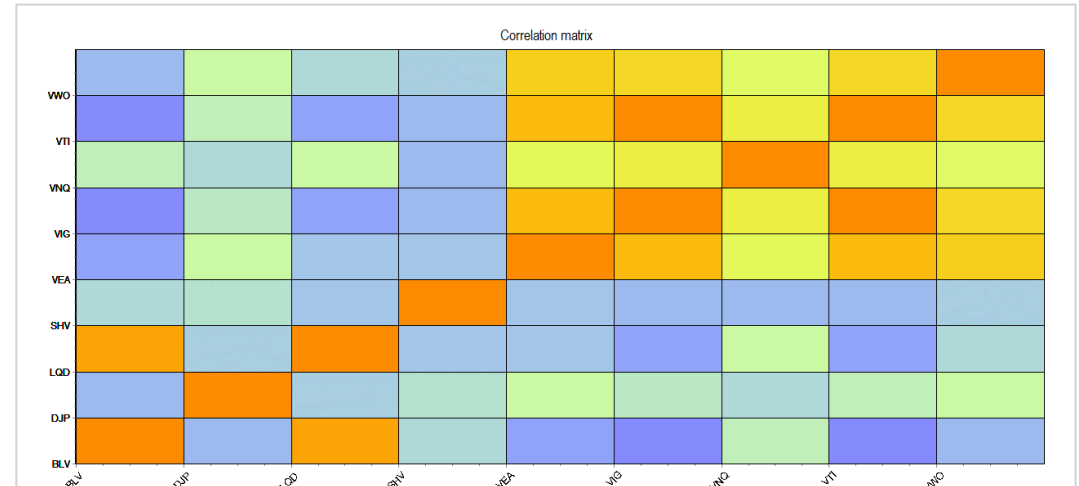


- Performance and risk measurement with various indicators
- Absolute risk: standard deviation, downside deviation, Maximum Drawdown, VaR, etc.
- Systematical risk: beta, tracking error
- Performance indicators: Sharpe ratio, Treynor ratio, information ratio, Jensen's alpha, etc.

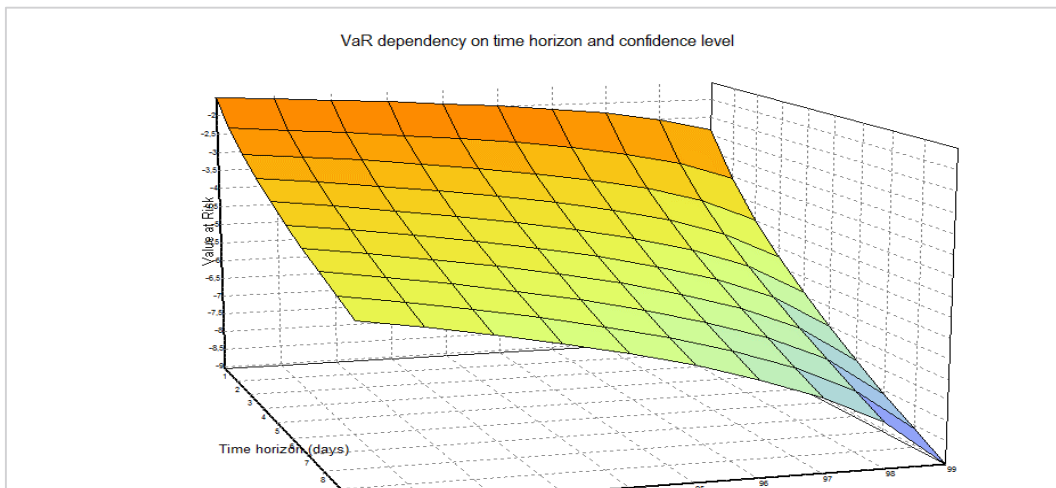
Value at Risk



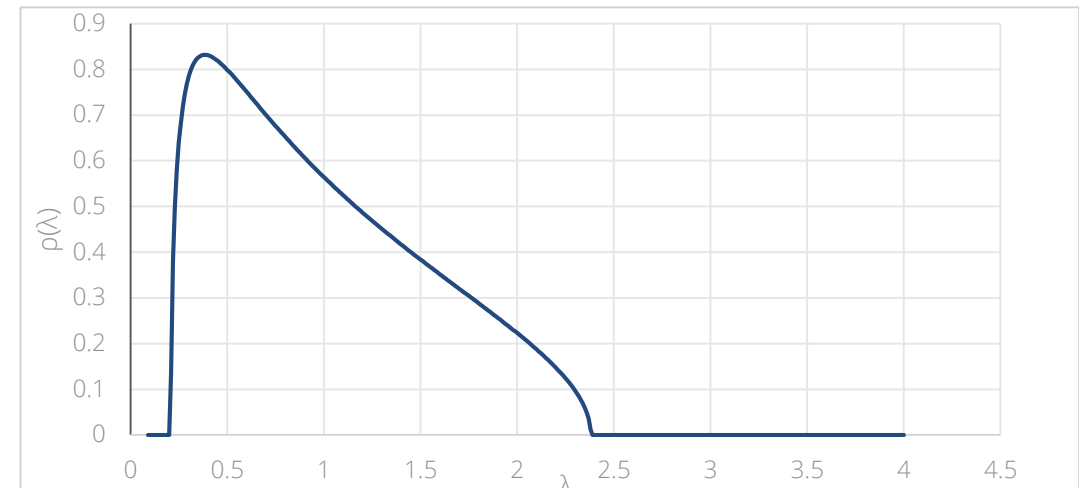
Value at Risk, Conditional Value at Risk



Correlation matrix



Dependence of Value at Risk on time horizon and confidence level



RMT construction of correlation matrix – MarčenkoPastur distribution

Stress testing

- Historical scenarios:
 - Lehman default (2008),
 - Dot Com collapse (2000),
 - etc.

- Custom scenarios:

$$E(Y|S) = E(Y) + \Sigma_{SY}^T \Sigma_{SS}^{-1} [S - E(S)]$$

S- shock vector, Y- vector of changes in return

- Stress testing correlation matrix

- Reverse stress testing

Example of stress testing

Ticker	Class	Change in value (%)	Change in value in portfolio (%)
ABB Ltd	dehice	-26,692	-2,053
Apple Inc	dehice	-33,906	-5,894
Baidu Inc	dehice	-34,540	-1,594
BNP Paribas SA	dehice	-26,692	-1,238
CNOOC Ltd	dehice	-26,692	-2,166
Deutsche Bank AG	dehice	-26,692	-2,464
Eni SpA	dehice	-26,692	-3,080
Google Inc	dehice	-33,906	-5,894
Potash Corp of Saskatchewan Inc	dehice	-9,842	-0,456
Samsung Electronics Co Ltd	dehice	-34,540	-2,002

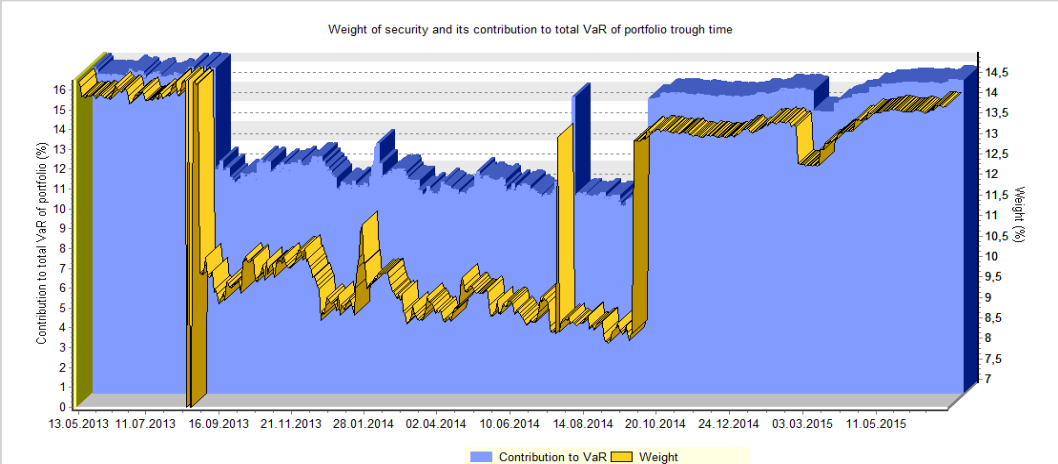
Example of reverse stress testing

Scenario	Shift of yield curve	EURUSD Currency	Shares emerging markets	Shares developed markets	Change in value of portfolio (%)
DotCom 2001 reglja	-0,036600	-0,143000	-0,236500	-0,320300	-33,965300
DotCom 2001 reglja	-0,035900	-0,137100	-0,226600	-0,307900	-32,632500
DotCom 2001 reglja	-0,033500	-0,131100	-0,216700	-0,293600	-31,292400
DotCom 2001 reglja	-0,032000	-0,125100	-0,206900	-0,280300	-29,945200
DotCom 2001 reglja	-0,030500	-0,119200	-0,197000	-0,266900	-28,590900
DotCom 2001 reglja	-0,028900	-0,113200	-0,187200	-0,253600	-27,229300
DotCom 2001 reglja	-0,027400	-0,107300	-0,177300	-0,240200	-25,860600
DotCom 2001 reglja	-0,025900	-0,101300	-0,167500	-0,226900	-24,484800
DotCom 2001 reglja	-0,024400	-0,095300	-0,157600	-0,213500	-23,101800
DotCom 2001 reglja	-0,022800	-0,089400	-0,147800	-0,200200	-21,711600
DotCom 2001 reglja	-0,021300	-0,083400	-0,137900	-0,186800	-20,314300
DotCom 2001 reglja	-0,019800	-0,077500	-0,128100	-0,173500	-18,909800
DotCom 2001 reglja	-0,018300	-0,071500	-0,118200	-0,160100	-17,498200
DotCom 2001 reglja	-0,016800	-0,065500	-0,108400	-0,146800	-16,079400
DotCom 2001 reglja	-0,015200	-0,059600	-0,098500	-0,133500	-14,653400

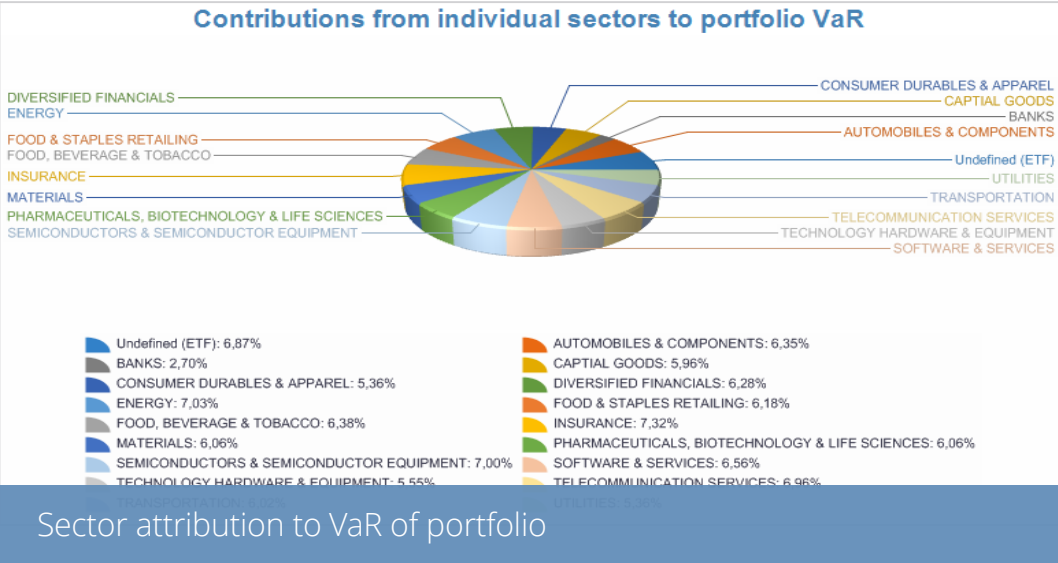
Risk attribution

Individual securities	Weight	Marginal VaR	Component VaR	Contribution to risk
CNOOC Ltd	8,115	-1,400	-0,114	5,314
Apple Inc	17,382	-2,648	-0,460	21,522
ABB Ltd	7,693	-1,623	-0,125	5,839
Baidu Inc	4,616	-2,005	-0,093	4,328
BNP Paribas SA	4,637	-2,217	-0,103	4,809
Deutsche Bank AG	9,232	-2,544	-0,235	10,985
Eni SpA	11,540	-2,408	-0,278	12,992
Google Inc	17,382	-2,164	-0,376	17,588
Potash Corp of Saskatchewan II	4,635	-1,838	-0,085	3,984
Sberbank of Russia	3,477	-3,470	-0,121	5,641
Samsung Electronics Co Ltd	5,796	-1,567	-0,091	4,248
Teva Pharmaceutical Industries	5,495	-1,071	-0,059	2,751

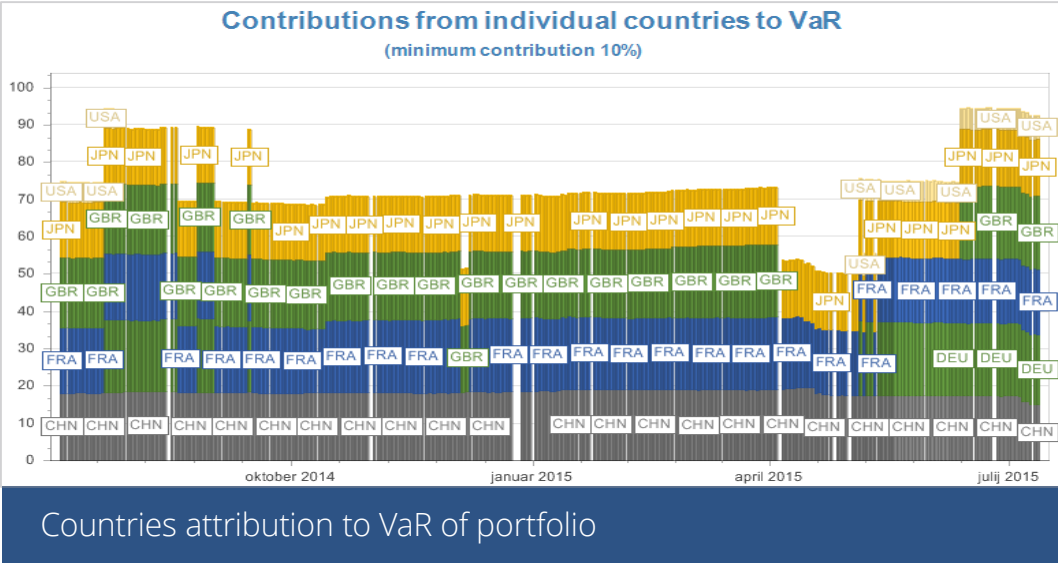
Marginal, Component VaR and contribution of securities to total VaR



Attribution of Individual securities to VaR of portfolio over time



Sector attribution to VaR of portfolio



Countries attribution to VaR of portfolio

Pre-trade

Parameters

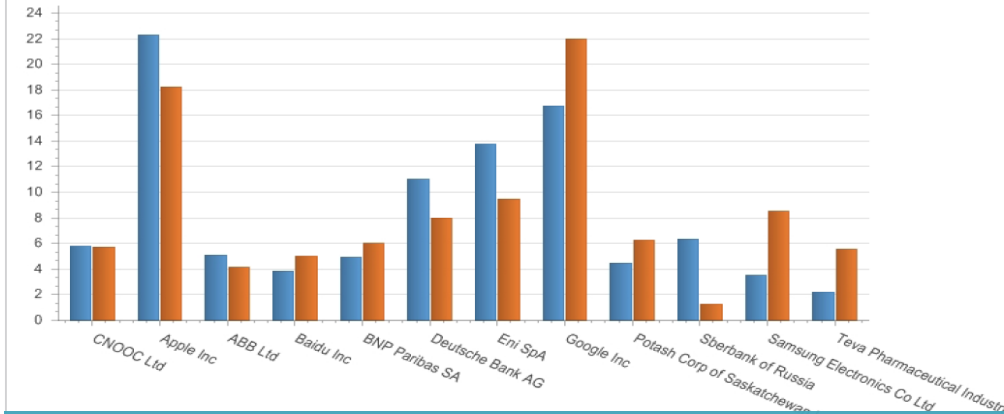
Calculation method	Historical method
Time unit (days)	10
Return distribution	Normal distribution
Confidence level	95

Approved.

	Start portfolio	Target portfolio	Change
Value at Risk	-4,97 %	-4,53 %	0,44 %
CVaR	-6,28 %	-5,72 %	0,56 %
Average maximum drawdown	-5,17 %	-4,75 %	0,43 %
Maximum drawdown at risk	-9,26 %	-8,56 %	0,70 %
CDAR	-10,67 %	-9,98 %	0,69 %

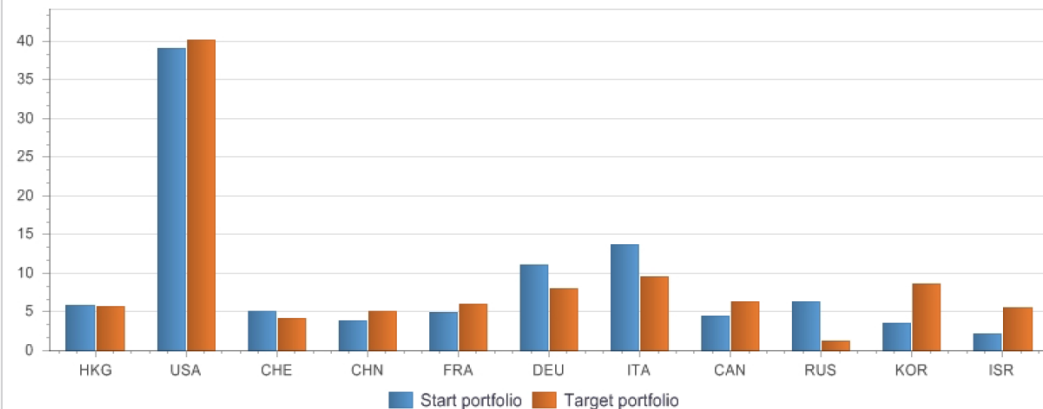
VaR compliance

Comparison of securities contribution to VaR



Comparison of securities contribution to VaR

Comparison of countries contribution to VaR



Comparison of countries contribution to VaR

Contributions to portfolio VaR of individual securities

Ticker	Portfolio share		Contribution to VaR		
	Start portfolio	Target portfolio	Start portfolio	Target portfolio	Change
CNOOC Ltd	8,12 %	8,75 %	5,81 %	5,68 %	-0,13 %
Apple Inc	17,38 %	14,58 %	22,31 %	18,19 %	-4,12 %
ABB Ltd	7,69 %	5,83 %	5,08 %	4,13 %	-0,95 %
Baidu Inc	4,62 %	4,86 %	3,84 %	5,01 %	1,17 %
BNP Paribas SA	4,64 %	5,83 %	4,95 %	6,01 %	1,07 %
Deutsche Bank AG	9,23 %	6,80 %	11,06 %	7,96 %	-3,09 %
Eni SpA	11,54 %	8,75 %	13,74 %	9,46 %	-4,27 %
Google Inc	17,38 %	19,44 %	16,75 %	21,92 %	5,18 %
Potash Corp of Saskatchewan Inc	4,64 %	6,80 %	4,42 %	6,27 %	1,85 %
Sberbank of Russia	3,48 %	0,97 %	6,31 %	1,28 %	-5,03 %
Samsung Electronics Co Ltd	5,80 %	8,75 %	3,55 %	8,55 %	5,00 %
Teva Pharmaceutical Industries Ltd	5,50 %	8,65 %	2,21 %	5,53 %	3,32 %

Contributions to portfolio VaR of individual securities

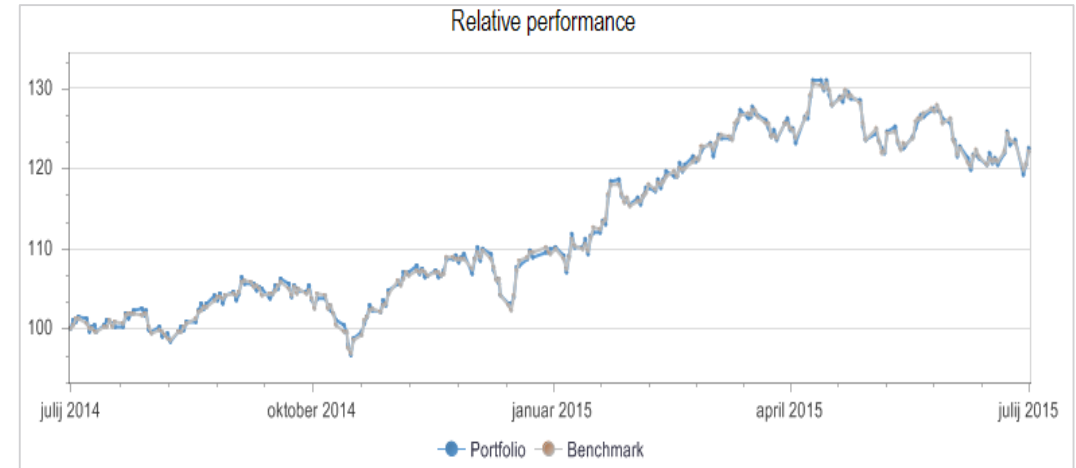
Performance measurement

Portfolio: Moderate Risk Equity Fund
Benchmark: MSCI AC World
Portfolio type: Equity Fund

Performance	Portfolio	Benchmark
3-m return	-1,76%	-2,34%
12-m return	22,53%	22,11%
36-m return	56,48%	57,47%
3-m excess return	0,58%	/
12-m excess return	0,42%	/
36-m excess return	-0,99%	/

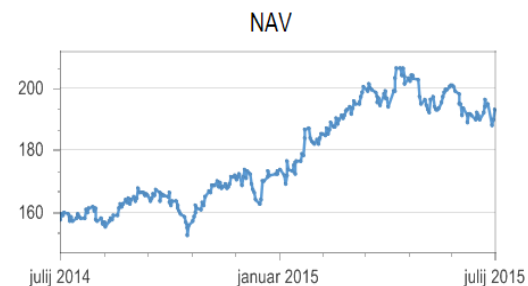
Performance	Portfolio	Benchmark
Information ratio	0,08	/
Sharpe ratio	1,32	1,55
Treynor ratio	21,78 %	21,01 %
Sortino	1,08	/
Jensen's alpha	0,09%	/

Performance indicators of portfolio management



Relative performance

Total risk	Portfolio	Benchmark
Annual standard deviation	16,53%	13,56%
Maximum drawdown	-9,12%	-8,42%
Downside deviation	16,24%	13,53%
Relative risk	1,22	/
VaR	-5,42%	-4,44%
Beta	1,001	1



Risk indicators

Performance indicators:

- Information ratio
- Sharpe ratio
- Treynor ratio
- Sortino
- Jensen's Alpha

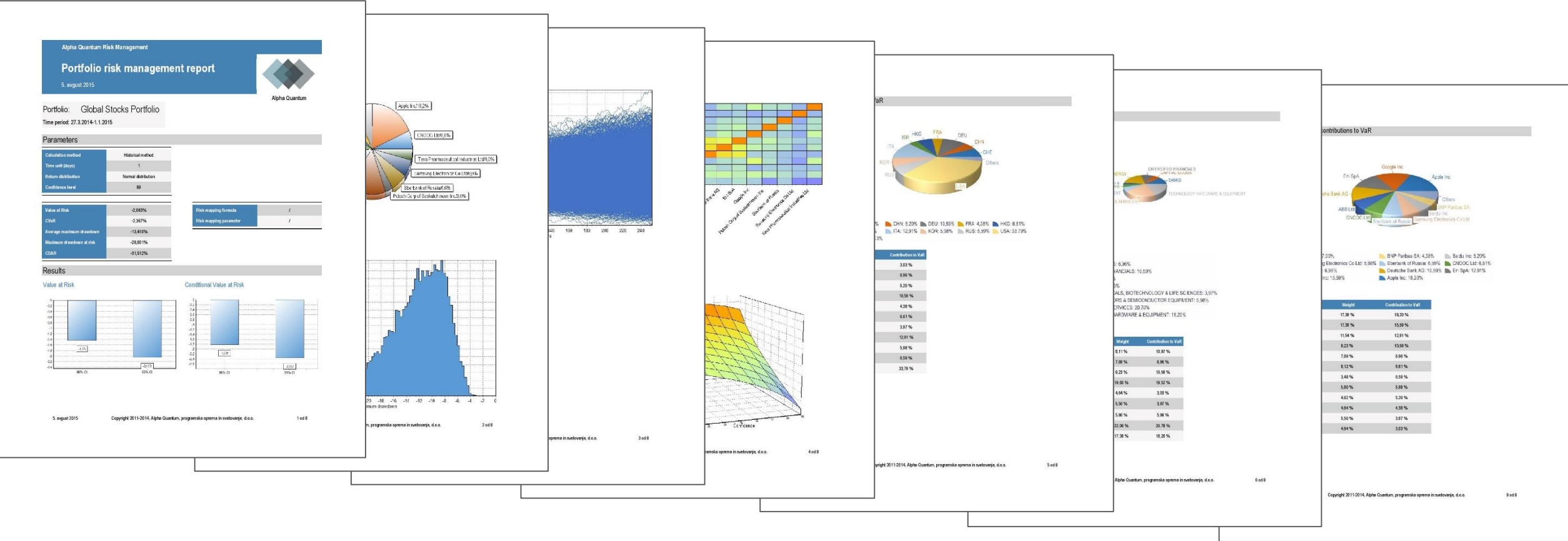
Risk indicators:

- Standard deviation
- Maximum drawdown
- Downside deviation
- Relative risk
- Beta

Selection of supported indicators

Powerful reporting capabilities

Example report 1



Powerful reporting capabilities

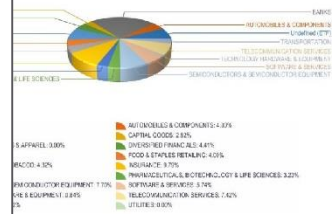
Example report 2



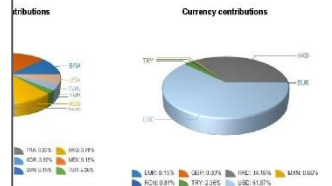
Report on contributions of securities and categories to VaR of portfolios

Emerging Markets Equity Fund

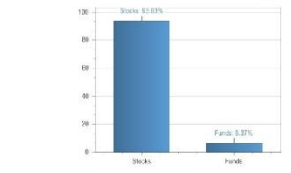
Contributions from individual sectors to portfolio VaR



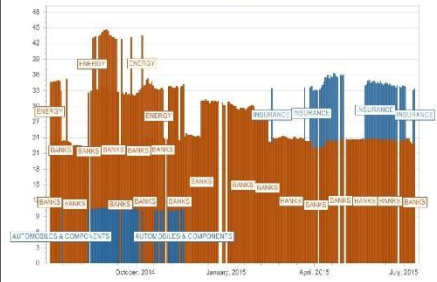
Contributions from individual countries and currencies to portfolio VaR



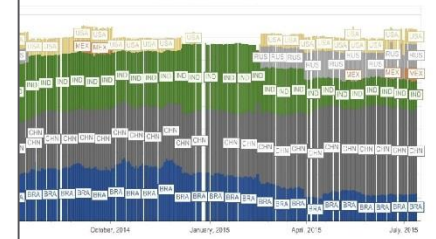
Contributions from individual asset classes to portfolio VaR



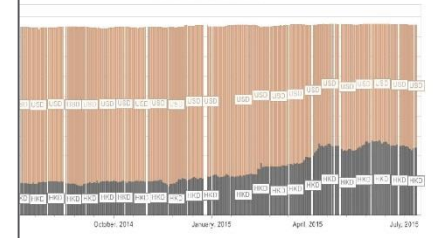
Contributions from individual sectors to VaR (minimum contribution 1%)



Contributions from individual countries to VaR (minimum contribution 1%)



Contributions from individual currencies to VaR (minimum contribution 1%)



Contributions from individual securities to portfolio VaR (minimum contribution 1%)

Contribution to VaR	Portfolio share
5.5720 %	4.8144 %
5.2888 %	4.0920 %
4.9804 %	4.3017 %
4.3423 %	3.0843 %
4.1884 %	4.3297 %
4.1074 %	6.4860 %
3.7844 %	2.7758 %
3.5176 %	4.8172 %
2.8929 %	1.8794 %
2.7808 %	2.3237 %
2.7375 %	2.4158 %
2.2519 %	2.1955 %
2.2204 %	2.2115 %
2.1955 %	1.1488 %
2.1225 %	2.5140 %
2.1095 %	1.5680 %
2.1014 %	2.0916 %
2.0652 %	2.2660 %
1.9647 %	0.8804 %
1.5216 %	1.3068 %
1.3888 %	1.6361 %
1.2259 %	1.1252 %
1.0220 %	0.8752 %
1.0843 %	1.4911 %
1.0840 %	1.3626 %

Powerful reporting capabilities

Example report 3

Pre-trade Risk Management - Alpha Quantum Risk Management

Pre-trade Risk Management

5. august 2015

13 Quantum Risk Management

e-trade Risk Management

August 2015

Global Stocks Portfolio_kopija_5.8.2015
27.3.2014-5.8.2015

RS

Method	Historical method	Approved
Simulation	10	
Method of simulation	Normal distribution	
Number of simulations	95	

	Start portfolio	Target portfolio	Change
Return	-4.87 %	-6.53 %	0.64 %
Volatility	-0.28 %	-0.72 %	0.59 %
Downside risk	-0.17 %	-0.75 %	0.43 %
Value at risk	-0.26 %	-0.56 %	0.79 %
Value at risk	-10.67 %	-8.98 %	0.69 %

Copyright 2011-2014, Alpha Quantum, programsko oprema in svetovanje, d.o.o. 2 od 6

Comparison of securities contribution to VaR

Security	Start portfolio	Target portfolio
MSFT US	0.10%	0.10%
AMZN US	0.10%	0.10%
GOOGL US	0.10%	0.10%
FB US	0.10%	0.10%
APPL US	0.10%	0.10%
ORCL US	0.10%	0.10%
IBM US	0.10%	0.10%
MSFT US	0.10%	0.10%
AMZN US	0.10%	0.10%
GOOGL US	0.10%	0.10%
FB US	0.10%	0.10%
APPL US	0.10%	0.10%
ORCL US	0.10%	0.10%
IBM US	0.10%	0.10%

Portfolio share	Start portfolio	Target portfolio	Contribution to VaR	Change
8.12 %	8.75 %	5.81 %	5.68 %	-0.13 %
17.38 %	14.58 %	22.31 %	18.19 %	-4.12 %
7.60 %	5.90 %	5.98 %	4.19 %	-0.95 %
4.62 %	4.98 %	3.84 %	5.01 %	1.17 %
4.64 %	5.93 %	4.95 %	5.01 %	1.07 %
9.23 %	6.86 %	11.96 %	7.86 %	-3.09 %
11.54 %	8.75 %	13.74 %	9.40 %	-4.27 %
17.38 %	18.44 %	16.75 %	21.02 %	4.18 %
4.64 %	6.06 %	4.42 %	5.07 %	1.65 %
3.48 %	0.97 %	6.31 %	1.28 %	-5.03 %
5.80 %	6.75 %	3.55 %	0.69 %	-0.60 %
5.50 %	0.85 %	2.21 %	5.53 %	3.32 %
0.00 %	0.06 %	0.00 %	0.00 %	0.00 %

Copyright 2011-2014, Alpha Quantum, programsko oprema in svetovanje, d.o.o. 3 od 7

Comparison of countries contribution to VaR

Country	Start portfolio	Target portfolio
CHN	0.10%	0.10%
USA	0.10%	0.10%
DEU	0.10%	0.10%
ITA	0.10%	0.10%
CAN	0.10%	0.10%
RUS	0.10%	0.10%
KOR	0.10%	0.10%
ISR	0.10%	0.10%

Portfolio share	Start portfolio	Target portfolio	Contribution to VaR	Change
8.75 %	6.81 %	5.68 %	-0.13 %	
34.61 %	38.06 %	40.11 %	1.06 %	
5.93 %	5.98 %	4.19 %	-0.95 %	
4.98 %	3.84 %	5.01 %	1.17 %	
5.93 %	4.95 %	5.01 %	1.07 %	
6.80 %	11.06 %	7.86 %	-3.09 %	
8.75 %	13.74 %	9.40 %	-4.27 %	
6.80 %	4.42 %	5.07 %	1.65 %	
0.97 %	6.31 %	1.28 %	-5.03 %	
8.75 %	3.55 %	5.53 %	5.00 %	
0.06 %	2.21 %	5.53 %	3.32 %	

Copyright 2011-2014, Alpha Quantum, programsko oprema in svetovanje, d.o.o. 4 od 8

Comparison of sectors contribution to VaR

Sector	Start portfolio	Target portfolio
TECHNOLOGY	0.10%	0.10%
FINANCIALS	0.10%	0.10%
INDUSTRIALS	0.10%	0.10%
CONSUMER DISCRETIONARY	0.10%	0.10%
HEALTHCARE	0.10%	0.10%
ENERGY	0.10%	0.10%
UTILITIES	0.10%	0.10%
REALESTATE	0.10%	0.10%
COMMODITIES	0.10%	0.10%
DEFENSE	0.10%	0.10%
TRANSPORTATION	0.10%	0.10%
TELECOMMUNICATIONS	0.10%	0.10%
CONSUMER STAPLES	0.10%	0.10%
INDUSTRIALS	0.10%	0.10%
FINANCIALS	0.10%	0.10%
INDUSTRIALS	0.10%	0.10%
CONSUMER DISCRETIONARY	0.10%	0.10%
HEALTHCARE	0.10%	0.10%
ENERGY	0.10%	0.10%
UTILITIES	0.10%	0.10%
REALESTATE	0.10%	0.10%
COMMODITIES	0.10%	0.10%
DEFENSE	0.10%	0.10%
TRANSPORTATION	0.10%	0.10%
TELECOMMUNICATIONS	0.10%	0.10%
CONSUMER STAPLES	0.10%	0.10%

Portfolio share	Start portfolio	Target portfolio	Contribution to VaR	Change
17.48 %	19.54 %	15.14 %	-4.40 %	
14.58 %	22.31 %	18.19 %	-4.12 %	
5.93 %	5.98 %	4.19 %	-0.95 %	
34.36 %	28.99 %	38.34 %	6.35 %	
6.80 %	11.29 %	7.28 %	-3.99 %	
6.80 %	11.06 %	7.86 %	-3.09 %	
6.80 %	4.42 %	5.07 %	1.65 %	
8.75 %	3.55 %	5.53 %	5.00 %	
0.06 %	2.21 %	5.53 %	3.32 %	

Copyright 2011-2014, Alpha Quantum, programsko oprema in svetovanje, d.o.o. 5 od 8

Comparison of currencies contribution to VaR

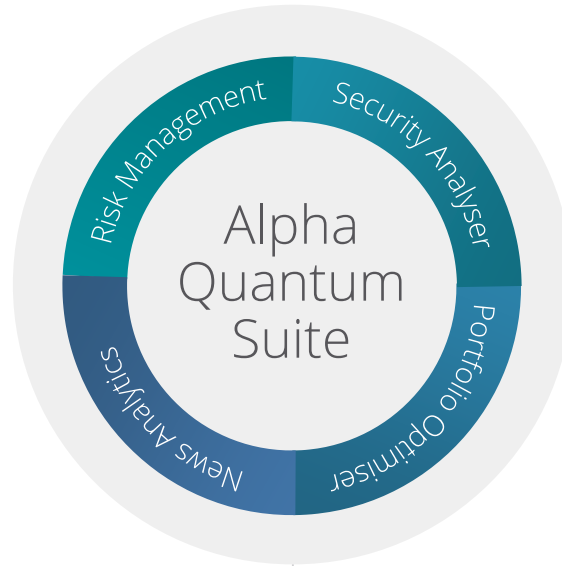
Currency	Start portfolio	Target portfolio
USD	0.10%	0.10%
CHF	0.10%	0.10%
EUR	0.10%	0.10%

Portfolio share	Start portfolio	Target portfolio	Contribution to VaR	Change
8.75 %	5.81 %	5.68 %	-0.13 %	
64.64 %	58.38 %	66.75 %	7.37 %	
5.93 %	5.98 %	4.19 %	-0.95 %	
21.28 %	28.74 %	23.44 %	-6.30 %	

Copyright 2011-2014, Alpha Quantum, programsko oprema in svetovanje, d.o.o. 6 od 8

Vision

We offer a complete and integrated platform for asset management, ranging from risk management, analysis, valuation and ranking of companies, portfolio optimisation, asset allocation, versatile backtesting of strategies and analysis of news.



The Alpha Quantum Way

Quantitative.
The core of our philosophy.

Innovative.
The main source of alpha returns.

Robust. Researched.
The cornerstone of our solutions is stability.

Alpha.
The consequence.

Alpha Quantum Risk Management



Main features of risk management solution are VaR methods, stress testing, pre-trade risk management, risk attribution, performance measurement. They also include limits monitoring, regulatory compliance and powerful reporting capabilities.

Alpha Quantum Security Analyser



Innovative solution for financial analysis, valuation and ranking of companies. Comprehensive and versatile platform for researching, backtesting and using quantitative strategies based on fundamental, pricing, news analytics and other data.

Alpha Quantum Portfolio Optimiser



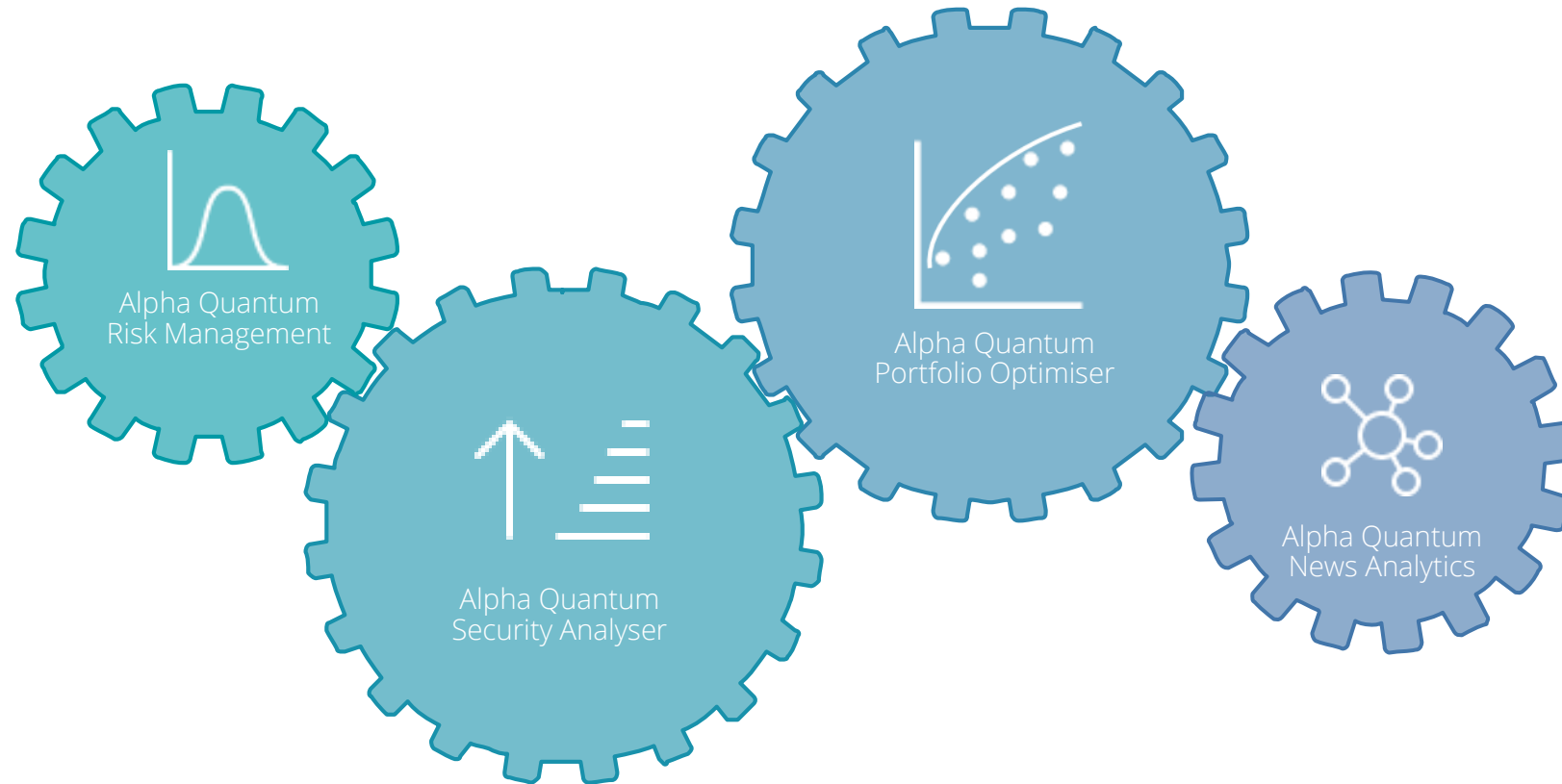
Sophisticated solution for portfolio optimization and asset allocation offering a wide array of features which support many different applications, investment products and can form a platform for automated asset management services.

Alpha Quantum News Analytics



Platform for scanning, annotating, storing and analysing in real time data from news, blogs, social media and other sources. Tools for identifying and analysing macro and sector trends. Sentiment scoring methodology. News analytics signals for quantitative trading strategies.

High integration and interconnectedness of solutions in Alpha Quantum Suite



Alpha Quantum

Quantitative. Innovative. Robust. Researched.
Alpha.

The Alpha Quantum Way.



Our solutions

Portfolio Optimiser, Risk Management, Security Analyser, News Analytics

Contact: Alpha Quantum, Franz-Joseph-Str.11 , 80801 Munich, Germany; Email: info@alpha-quantum.com