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A Finance Technology Solutions Company

An introduction to FINQUEST ™

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▶ **Introduction**

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Contract Data Warehouse

Accounting, Trade Ledger & Reconciliation

Liquidity Management, Basel II/III & Regulatory Reporting

FINQUEST ™

Contract Data Warehouse

- Robust data model to capture trade level data
- No loss of granularity

Accounting Engine

- Event Manager
- Accounting Template
- Acct. Entries Generator
- Trade Level Ledger

Reconciliation

- Multi source
- Multi dimensionality
- Netting/Pair-off features

Liquidity Mgt, Basel II/III, Reg. Reporting

- Extensive coverage of asset classes and reports
- Stress Testing, Drill back and Adjustments Functionality

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Detailed view of Data

- Maintain data granularity
- Need trade level ledger

Efficient Mgt. of Accounting Rules

- Event based application of accounting rules
- Accounting Templates

Faster Reconciliation

- Configurable and Faster
- Auto netting and pair-off

Liquidity Risk , Basel II/III & Reg. Reporting

- Solution for ever-changing regulation
- Trace-back

System Limitations

- Adhoc systems (Excel/Access/Scripts)
- Data Integration Challenges
- Accounting rules hard-coded into the system

Implementation Challenges

- Drill back from ledger to source not possible
- Metadata and structural integrity missing
- Reconciliation needs to be done manually

Increasing Complexity

- Increasing calculation complexity and data volumes
- Several key attributes are dropped in aggregation

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Contract Data Warehouse	Accounting Trade Ledger Reconciliation	Reg. Reporting Liquidity Mgmt. Basel II/III

Financial Rules Manager — **Accounting Engine** — **Reconciliation Engine** — **Data Integrator** — **Reports Metadata**

Real-time Traceability Data model

- Financial Rules Manager
  - Configurable approach to rule management
  - Transformations, Enrichment, Allocations
  - Built in Statistical functions and time-series analysis
- Accounting Engine
  - Definition of accounting event
  - Event to Accounting Template map
- Reconciliation Engine
  - Ability to bring in multiple datasets to same dimensions
- Data Integrator
  - Consolidates data silos
  - Supports XBRL
- Report Metadata
  - Ensures rules and results tie-up

Solution approach delivers data model and business rules out of the box

Simple integration between front, middle and back office systems

Creates standard business event mapping to standard accounting process

Business Rules are consistent, visible and auditable

Reporting available at Legal Entity and Business Unit Level

Strong support for Stress Testing and Top-Side Adjustments

Drill-down from summarized aggregate balances (GL) to underlying details

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Business Modules

Contract Data Warehouse

Accounting Engine, Trade Ledger and Reconciliation

Liquidity Mgmt. Basel II/III and Regulatory Reporting

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Appendix

Consolidate data from various internal and external sources
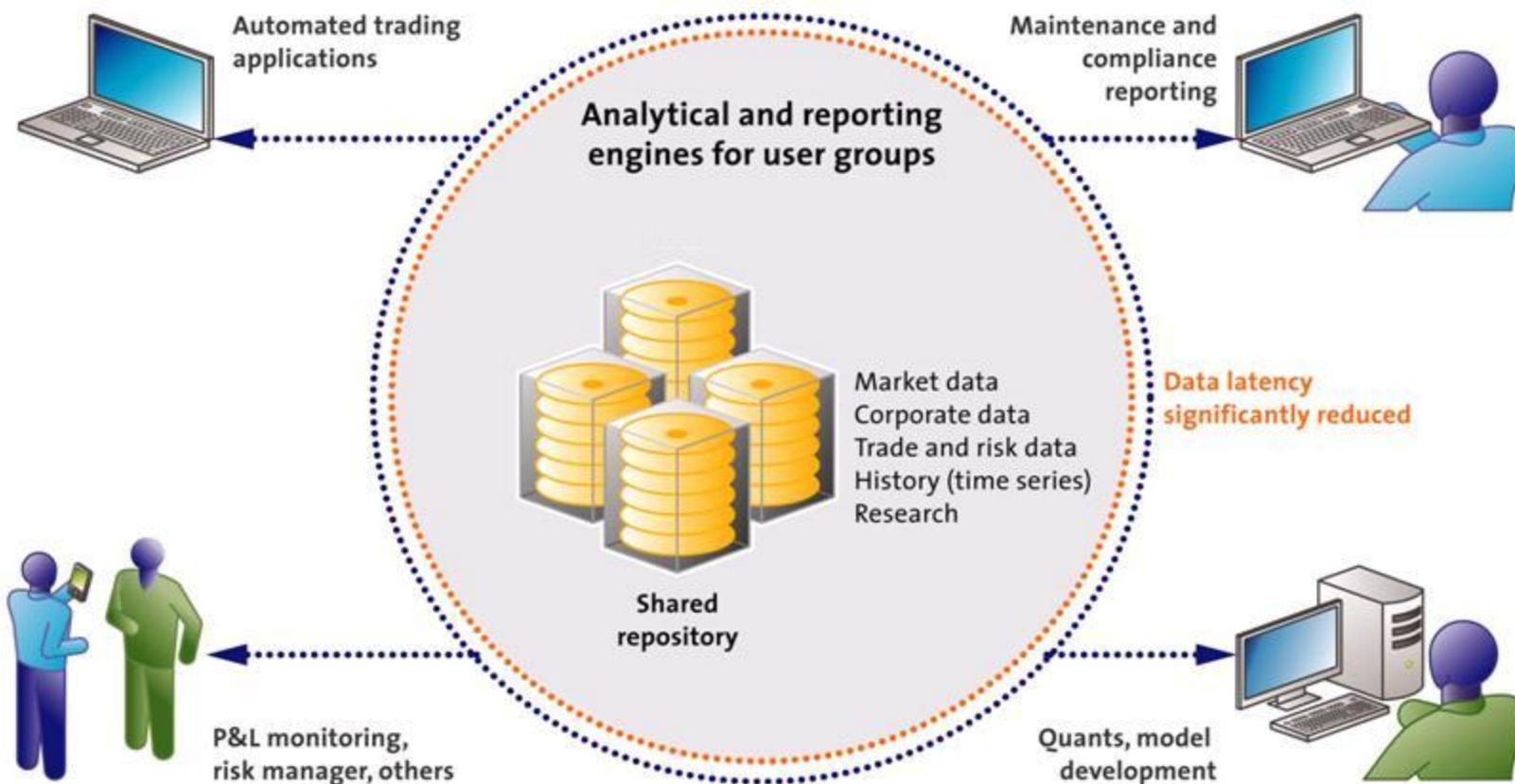
- ❑ Centralized Contract Data, Reference Data and Finance data

- ❑ Strong and robust data model with extensive coverage of asset class and asset lifecycle

- ❑ Complete transaction data with no loss of granularity

- ❑ Complete historical and market data to support risk calculation

- ❑ Unified access and reporting layer

- ❑ Ability to consume streaming, real-time and batch data

- ❑ Data archival and retrieval

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Data Elements:

- ❑ Trade Data
- ❑ Finance Data
- ❑ Market Data
- ❑ Risk Data
- ❑ Reference Data
- ❑ Enrichment Maps
- ❑ Accounting Rules
- ❑ Reconciliation Rules
- ❑ Exposures
- ❑ Calculations
- ❑ Reporting Mart
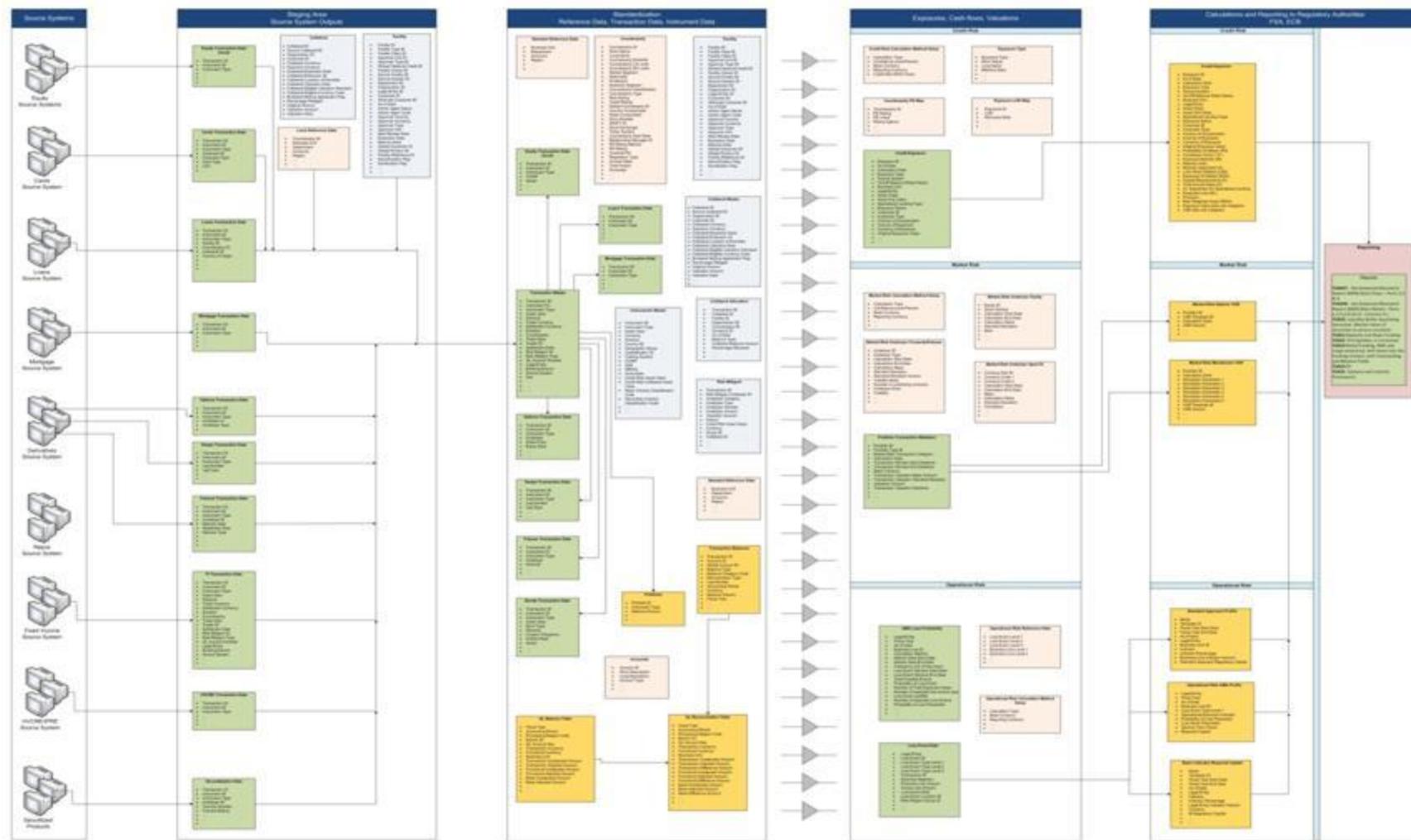
Data Capture -> Business Rules -> Validations -> Entries

Accounting Engine

Event Manager | Accounting Template | Accounting Entries | Trade Level Ledger

Generates Accounting Entries for

- Thin ledgers such as Local Ledger and Group/Corp Ledger as single book of records
- Thick ledger as a Trade/Instrument/Contract ledger with balances
- US GAAP, IFRS

Provides core general ledger accounting capabilities via web interface

Supports Book Configuration, Accounting Entry templates, Accounting process, Adjustments and Reporting

Core data model captures all the key entities for financial flows that manage the accounting process

Built-in support for auto-reconciliation between transaction & finance data

Preserve data granularity facilitating drill-down to transaction detail

Built-in top side adjustments functionality for Management, Legal and Regulatory Adjustments

Metadata Repository → Accounting Rules → Accounting Entries → Manual Adjustments → Export to GL

Accounting engine can support various types of transactions / business events

- Equities and Fixed Income Bonds
- Treasury Transactions
- Derivatives
- Various types of loans , mortgages
- Complex structures
- Cards
- Deposits
- Cash , Future Swaps so on
- Amortization

Accounting Engine can support following type of amount calculations

- Position – Physical holding of bond
- MTM – Mark to Market
- Accrual – Accrued interest on trade
- Balances – Different balance types
- Supports information at transactional and journal level

- Double entry postings generated
- Asset/liabilities, valuation, accrual and settlement postings
- Consolidated financial profit and loss reporting
- Business area trial balances

Reconciliation Engine

Reconcile Journals & Balances Posted to all Ledgers (Local, Global & Trade)

Capabilities of automating the reconciliation process between multiple data sets (e.g. finance-risk reconciliation).

Designed using a common rules framework and a web based application interface

All source definitions and reconciliation rules are effective dated

Built-in reporting module which provides a web-based display of any reconciled and non-reconciled items

Facility to auto-match, auto-pair-off, auto-net, recycle error rows, and maintain logs & reconciliation history

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- Real-time configuration of Asset Class
- Configurable of Rules, Formulae
- Real-time trace-back from to sources
- Data Lineage Tracking

- Cash flow Calculations
- Mismatch Calculations
- Concentration Risk

- Stress Testing and What-if analysis
- Adjustments Features
- Out-of-the-box rules and reports

Liquidity Risk Management

Liquidity Risk: The risk that a firm, although solvent, either does not have available sufficient financial resources to enable it to meet its obligations as they fall due, or can secure such resources only at excessive cost

Asset Class Coverage

OTC derivatives, ETD margins, OTC margins, OTC derivatives (downgrade triggers), FX, Debt securities, Own account debt securities, Equities, Repos and reverse repos, Stock borrowing and lending, Deposits, Loans, Commodities, Facilities, GL accounts and current year P/L, Non-margin collateral movements, nostros and vostros

Reports Coverage

FSA 047, 048, 049, 050, 051, 052, 053, 054

Dimensions

Business/Organization, Legal Entity, Cost Centre, Business Sector, Accounting book , Trading Book, Customer Data, Customer Type/Code, Geography, Credit Rating, Internal Reference Data, Product Type, Source Product Code, Source System, Industry sector codes and others

Liquidity Risk Management – Reports Coverage

Report Name	Description
FSA047	Enhanced Mismatch Report (EMR) Daily Flows – Parts 2,5 & 6
FSA048	Enhanced Mismatch Report (EMR) Main Details - Parts 1,2,5,6,9,10,11. Columns A-J
FSA50	Liquidity Buffer Qualifying Securities: Market Value of securities in various countries
FSA51	FSA51:Deposits and Repo Funding
FSA52	Pricing Data, in currencies
FSA53	Retail Funding, SME and Large enterprise, Drill down into the funding streams, with Outstanding and Balance Fields
FSA54	FX
FSA55	Systems and controls Framework

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High performance

Tightly integrated with underlying data model

Support simulations

Support stress testing

Support complex mathematical functions
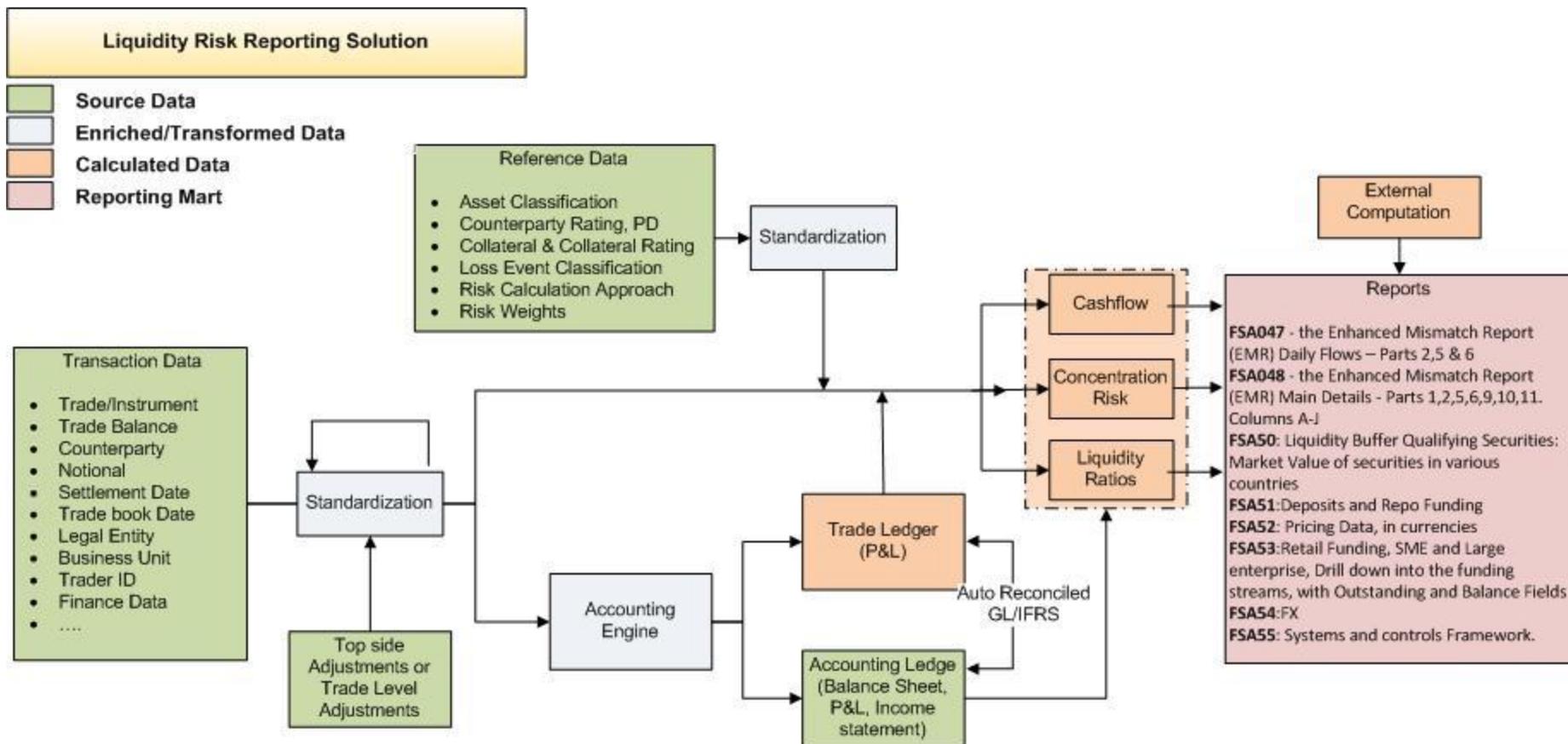
BASEL II/III

Consolidated Data Management
- Fin-Risk, Reference
- Single point of control

Extensive Coverage
- Standardized, Foundation and Advanced IRB Approach
- RWA, EC, RC , RORAC, correlation

Pillar II – Supervisory Review support
Basel III – Liquidity Management Implementation

Traditionally Basel calculations were performed in isolation by banks finance group. Going forward there will be a much greater reliance on risk systems under Basel II and III. The Target Operating Model will define inputs, outputs, process and ownership.

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Investors should be provided with a more transparent view of a Bank's risk exposure

Transparency

Convergence

BASEL II/III
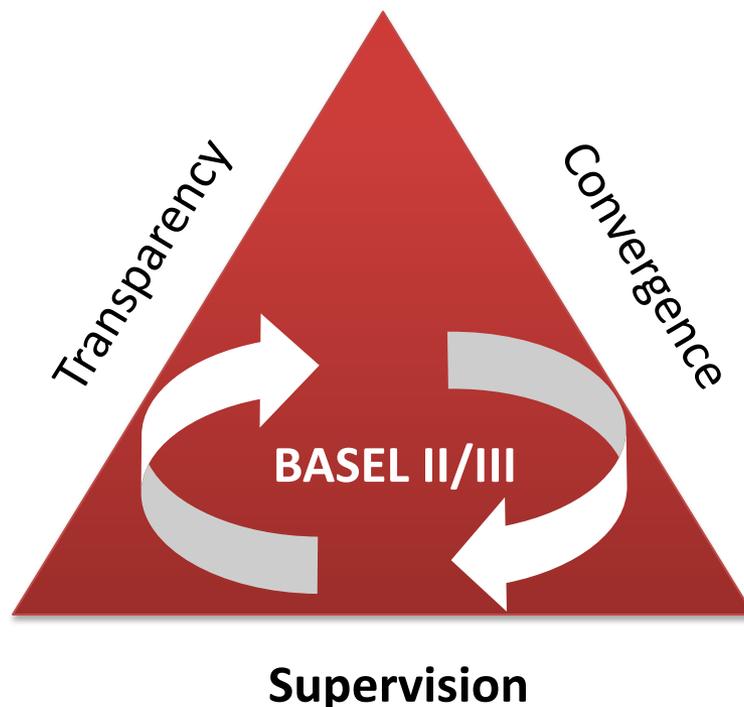
Regulatory capital should be more closely aligned with the risk profile of the Bank

Supervision

Regulators should have greater supervisory powers to increase capital requirements on a case-by-case basis

BASEL II PROCESS FLOW
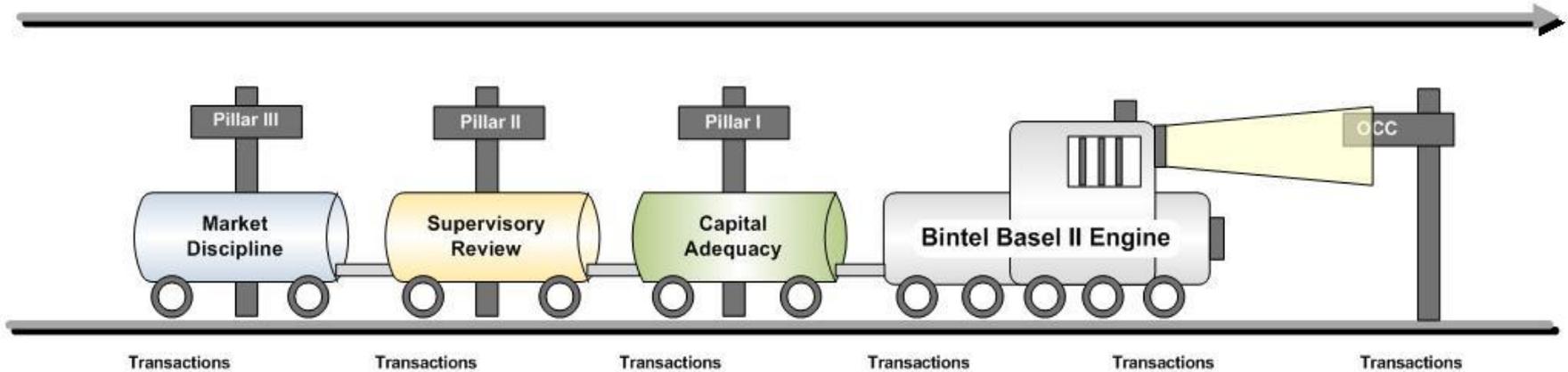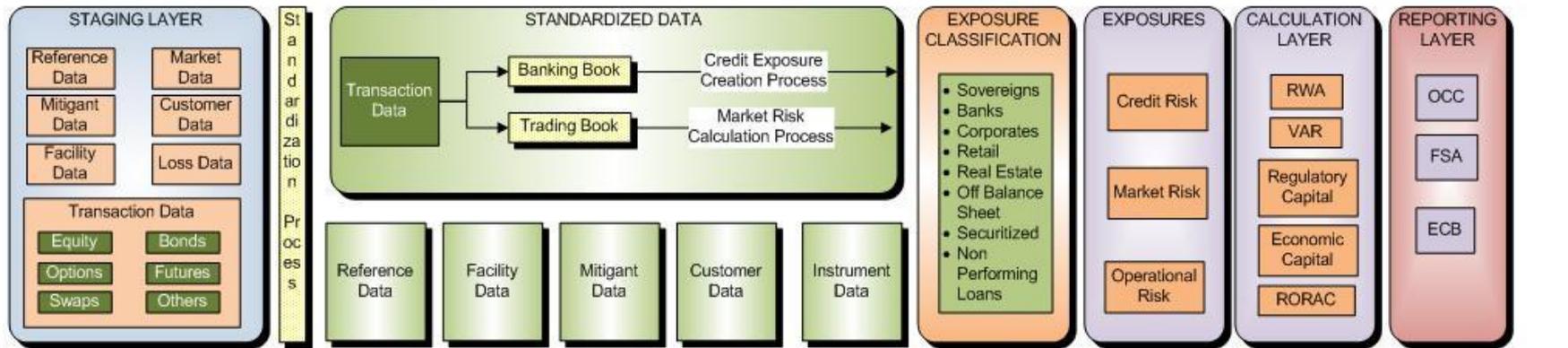
Credit Risk Methodology

Standardised Approach

Risk weights are derived at facility (product) level (Similar in principle to Basel I)

Foundation Internal Rating Based (FIRB)

Banks estimate the probability of default (PD) for different asset classes, while EAD and LGD are given by the regulator

Advanced Internal Ratings Based (AIRB)

Banks input the probability of default (PD), loss given default (LGD), exposure at default (EAD), and given by Basel II to derive risk weights.

AIRB Exposure Classes

Wholesale

Central Governments and Banks
Institutions
Corporate
- Specialised Lending
- Purchase Receivables
- SME
Equity
Securitisation

Retail
- Residential Mortgages
- Qualifying revolving
- Other Retail
Other Assets and Non Credit
Obligations

Standardised

- Measure credit risk pursuant to fixed risk weights based on external credit assessments
- Least sophisticated capital calculations; generally highest capital burdens
- Most Japanese banks will start Basel II as standardised banks
- Most US banks will stay under Basel I (or, more likely, will move to Basel 1½)

Foundation IRB

- Measure credit risk using sophisticated formulas using internally determined inputs of probability of default (PD) and inputs fixed by regulators of loss given default (LGD), exposure at default (EAD) and maturity (M).
- More risk sensitive capital requirements
- Most European banks will likely qualify for Foundation IRB status at start of Basel II

Advanced IRB

- Measure credit risk using sophisticated formulas and internally determined inputs of PD, LGD, EAD and M
- Most risk-sensitive (although not always lowest) capital requirements
- Transition to Advanced IRB status only with robust internal risk management systems and data
- Top 10 US banks expected to implement Advanced IRB at start of Basel II

Under Basel II, banks have strong incentive to move to IRB status and reduce capital charges by improving risk management systems

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Vertiv's risk management module clients now can perform key risk management tasks in one piece of software with one data base, one graphic user interface and one set of analytical libraries:

- Calculate Historic and Monte Carlo VaR
- Pricing of various instruments
- Stress testing
- GARCH
- Fund Transfer Pricing
- Grid

Available analytics include value-at-risk statistics, exposure, sensitivities, stress testing, risk attribution, credit exposure, what-if, factor models, and spread modeling for various security types.

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- ❑ The board of directors and senior management are actively involved in the oversight of Operational risk management framework.
- ❑ It has an operational risk system that is conceptually sound and implemented with integrity.
- ❑ It has sufficient resource, controls and audit procedures in place within the major business lines

Loss distribution function

Budgeting for EL

Capital Model

Loss (£)

Expected loss   Actual loss

Provisioning cover EL
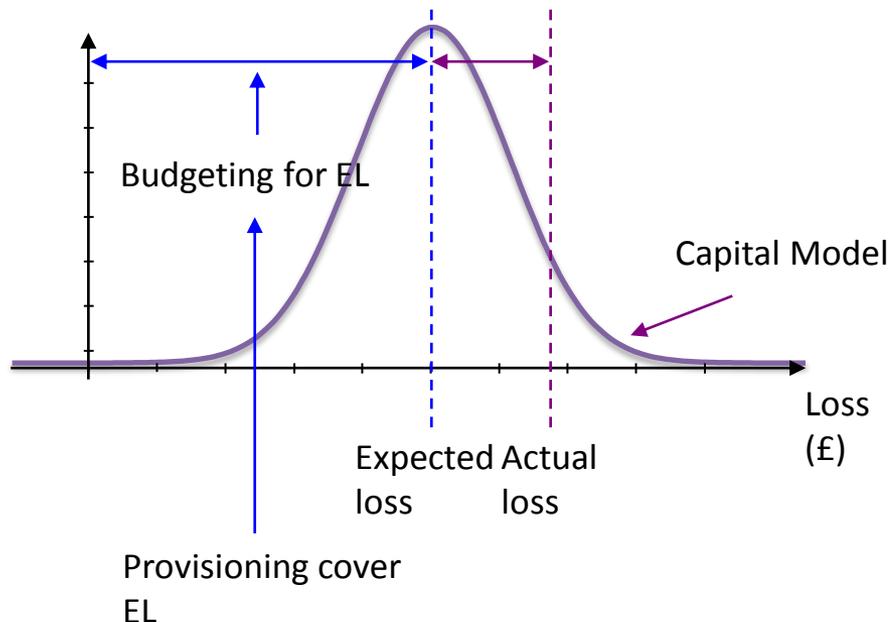
Our Approach

Explicitly Budgeting for Expected Losses will be used to demonstrate compliance

Group wide risk reporting system

Leverage off the existing frameworks, Board Governance Standards and work done as a result of Sarbanes Oxley

Basic Indicator Approach (¶¶ 649-651)

❑ 15% of bank's average annual gross income over previous three years

Standardised Approach (¶¶ 652-654, ¶¶ 660-663)

❑ Capital charge for each of 8 business lines calculated against average annual gross income for business line times:

- 18% for corporate finance (15% transitional charge within EU if major activity)
- 18% for trading and sales (15% transitional charge within EU if major activity)
- 12% for retail banking
- 15% for commercial banking
- 18% for payment and settlement
- 15% for agency services
- 12% for asset management
- 12% for retail brokerage

Advanced Measurement Approach (¶¶ 655-659, ¶¶ 664-679)

❑ Calculated on basis of internal operational risk management system approved by national regulator

Regulatory Reporting

Real-time configuration
- Asset Class
- Rules, Formulae and Cells

Real-time trace-back
- Results to sources
- Data Lineage

Hierarchical Rule Definition Interface
Reports Metadata for Rule-Cell association

Rapidly changing regulatory requirements, limitation of organically grown systems and need for cross-functional warrants a configurable, rule-driven system with extensive auditing support

Architected for changing regulations

- Metadata driven approach makes it easy for on boarding new reports

- Two step rule transformation approach brings modularity to process

- Extensive support of finance functions ensure good coverage of the requirements

- Inbuilt traceability and Reconciliation features ensure migration of rules and debugging easy

- Set based operations can meet volume requirements

- Traceability / Drill back is query based instead of storing results

- Metadata approach maintains cell to rule linkage for drill back

- ❑ Report metadata links Report – Schedule – Part – Line - Cell
- ❑ This allows marrying a regulatory rule to a report cell
- ❑ Rule to Cell association allows trace back from cell to source
- ❑ Report metadata also ensures if all the line items are being reported
- ❑ On boarding new regulatory report is configurable by business user and fast

Report → Schedule → Part → Line → Cell

Source Data → Rule
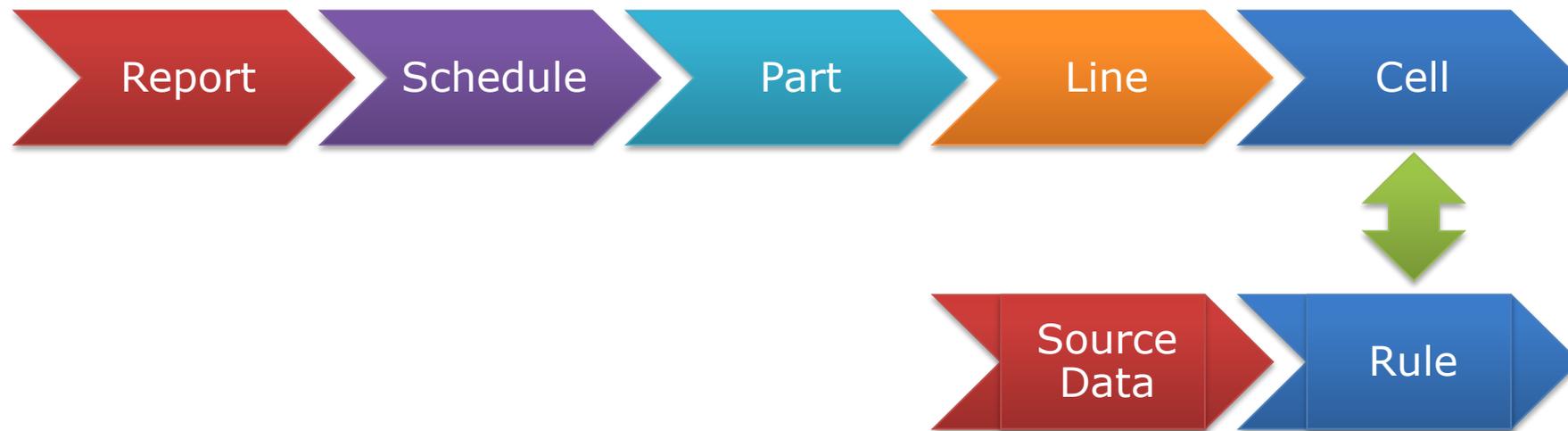
Introduction

Business Modules

▶ **Application Components**

    Data Integrator

    Financial Rule Manager

    Calculation Engine

    Reports Metadata

    Process Scheduler and Security

Application Features

Summary

Appendix

Consolidate the data from the various internal and external data sources

These sources include streaming data, real-time data or batch data

Designed for mass volume processing

Effective dated logic for integration template

Database Agnostic
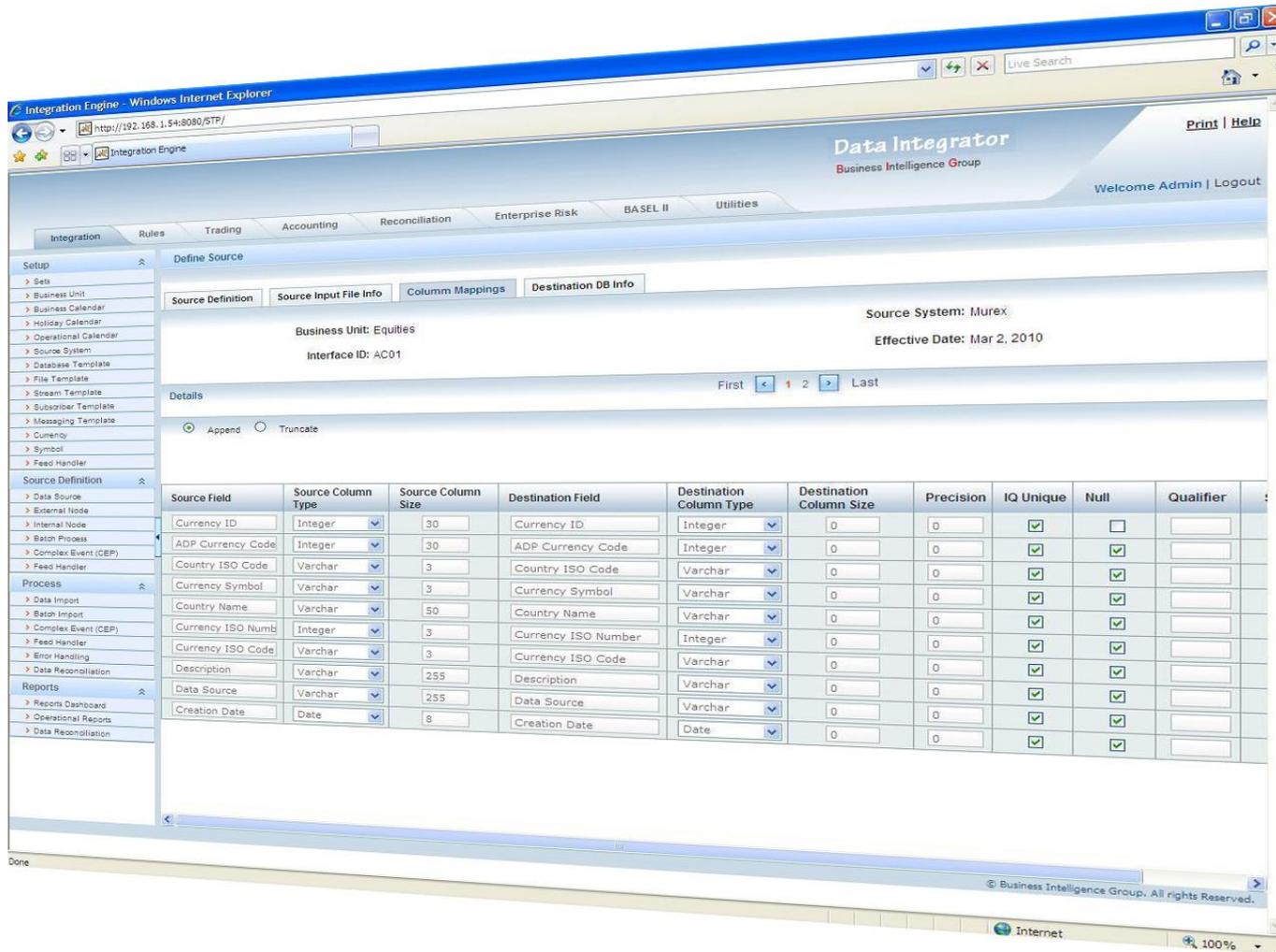
Data Integrator

Source Definition Page

- Definition details
- Input File Info
- Column Mappings
- Destination DB info

- ❑ Web interface for business, semi-technical, operational and power users to define and execute rules on the data

- ❑ Capabilities to create complex data/event driven rules and rule sets (combination of several rules into a logical flow chart)

- ❑ Designed to handle all major kinds of rules used in the industry. The primary ones are – Data Manipulation, Enrichment, Standardization/Transformation, Aggregation, Reconciliation, Allocations, and Accounting

- ❑ Easy configuration. GUI supports the standard drag-drop

- ❑ Auditability. The rules are stored in the system data tables

- ❑ Effective Dated. The engine maintains the history of all definition changes

- ❑ Performance. Mass data processing using set operations

- ❑ Object Repository. The rules can be applied to a set of business objects that are user-configurable
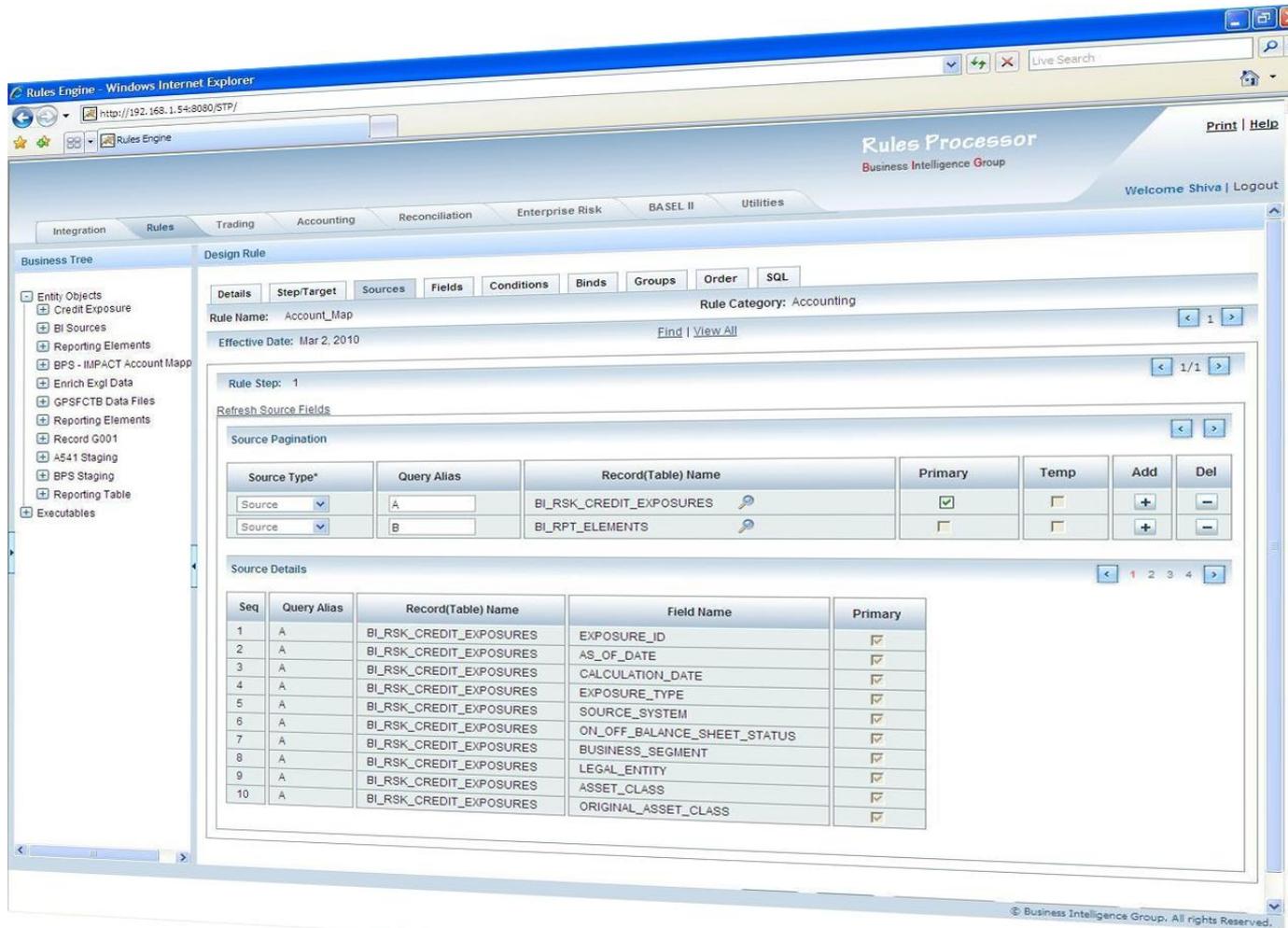
Business Rules Manager

Rule Creation Page

- Definition Details
- Step/Target
- Sources
- Fields Mappings
- Conditions
- Binds
- Groups
- Order
- SQL
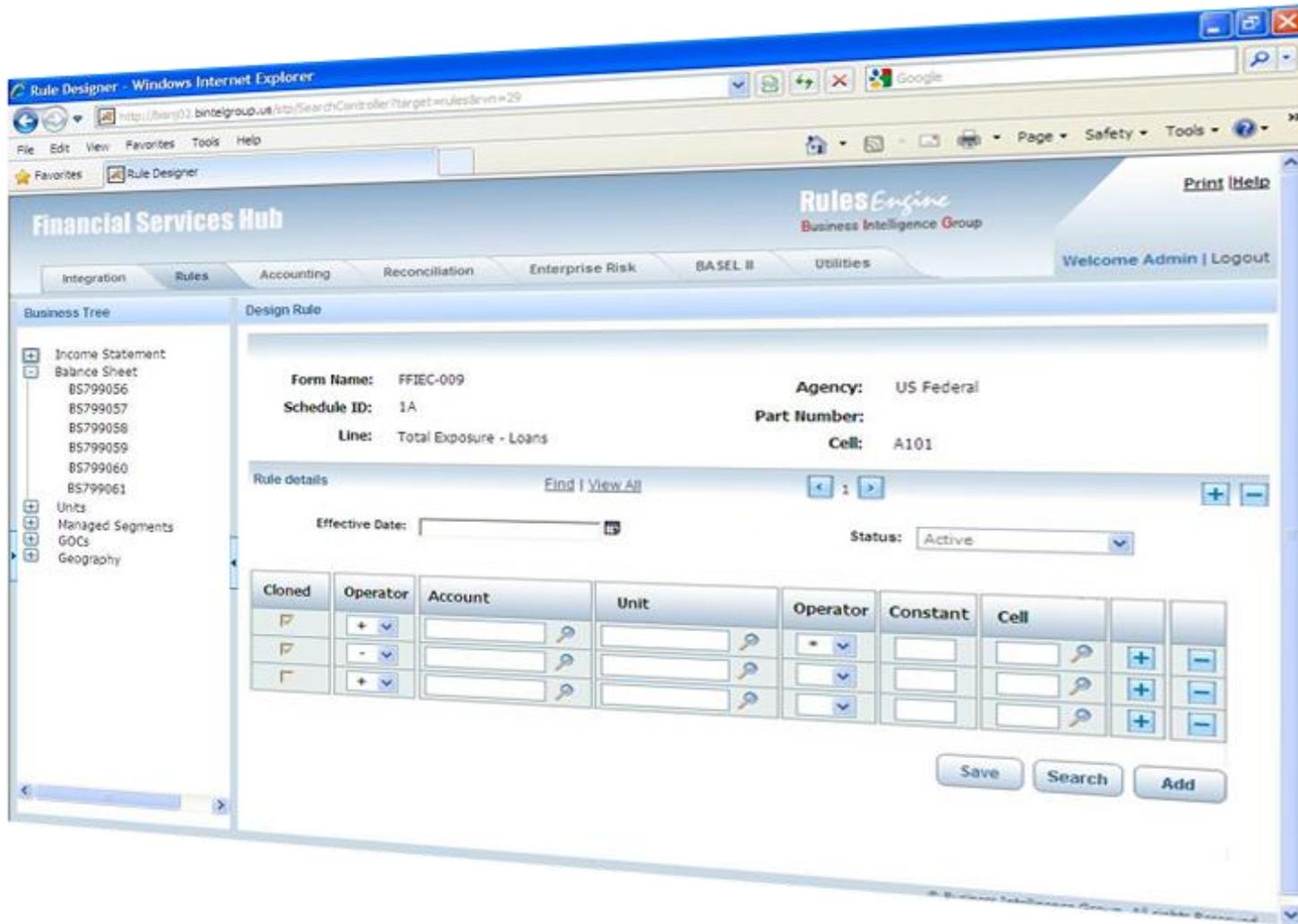
Hierarchical Reporting Rules

Rule Creation Page

- *Business Tree*
- *Cell Definition*
- *Account*
- *Unit*
- *Scaling Factor*
- *Cloning Feature*

- ❑ Combines asset and liability management, Trade Data, Position Data, Collateral Data.

- ❑ Calculates cash-flows for major asset classes

- ❑ Calculates concentration risk

- ❑ Calculated liquidity ratios

- ❑ Calculates above under stress conditions

- ❑ Provides capabilities to invoke risk models using a visual web based interface that can be used by quantitative analysts and, financial engineers using a meta-data driven framework

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Calculations

Position Management Page

- *Position by Asset Class*
- *Collateral Capture*
- *Trade Details*
- *Filter Options*

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❑ Users have an option to setup the following:

    ❑ Report Overall Details (e.g. Name of report, reporting agency, format etc)

    ❑ Schedules and Section

    ❑ Line Items (e.g. Asset Exposure for Foreign receivable)

    ❑ Cell Items/MDRM items (e.g. A101, L104 etc)

    ❑ Maps between Report line to Report cells

    ❑ Rule set for cell (for tracing back which computation resulted in the computation of the value)

❑ Currently we are covering Metadata for:

    ❑ FFIEC - 002, 002S, 009, 009a, 019, 030, 030S, 031, 041, 101, 102

    ❑ Basel II – OCC reports. (These are essentially FFIEC101 MDRN reports)

Components – Reports Metadata

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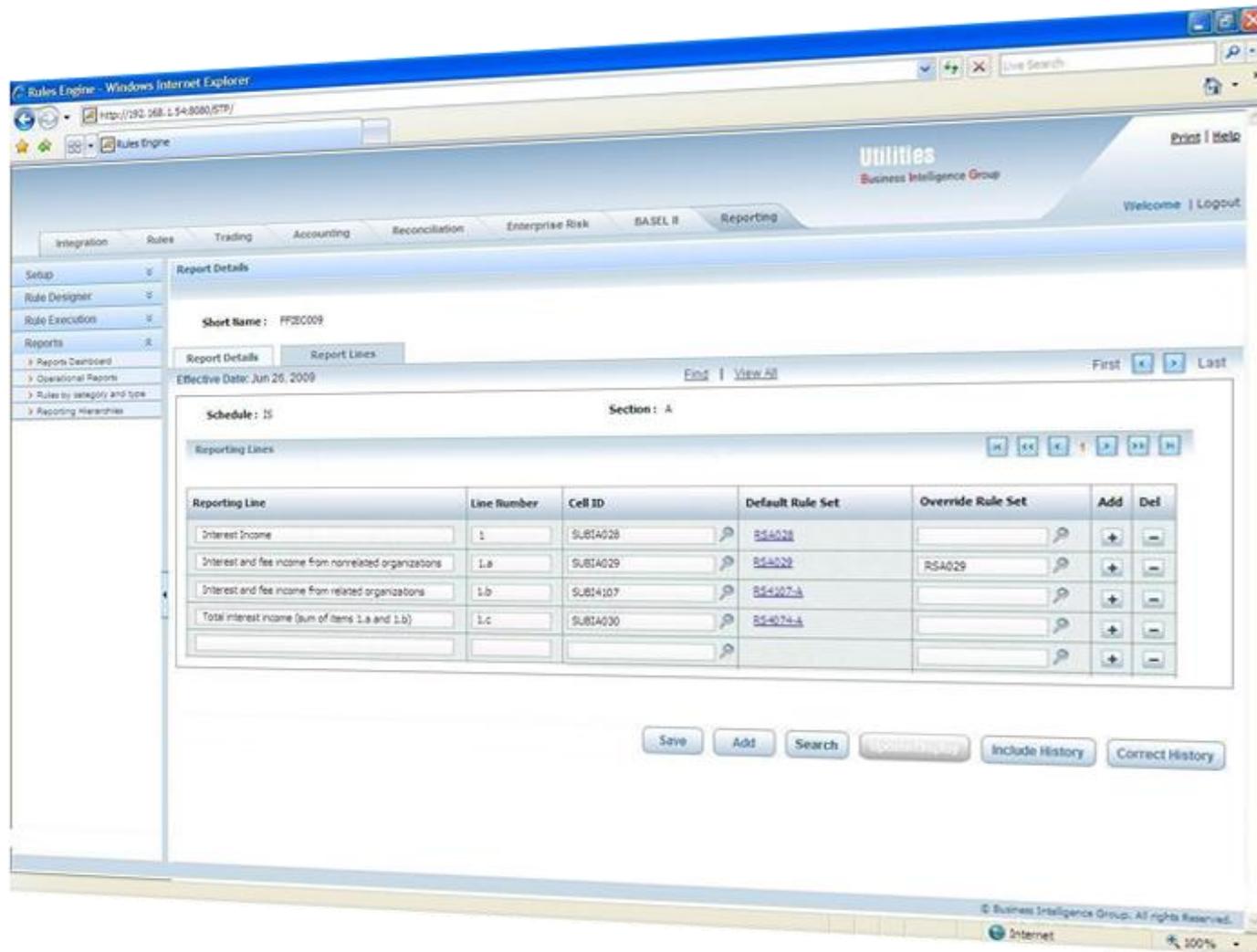
Report Metadata

Line Creation Page

- *Ability to define Report Line*
- *Line Number*
- *Cell ID*
- *Default Rule Set*
- *Over Ride Rule Set*

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❑ **Process Scheduler**

    ❑ Ability to define Process Types, Processes, Jobs and Job Streams.

    ❑ Supports recurrences and provides run time configuration (via Run Control) to enable Jobs and Job streams to be scheduled.

    ❑ Jobs can be run on-demand or associated to recurrence instances

    ❑ Built using a comprehensive meta-data model and a J2EE standard scheduling algorithm.

❑ **Security**

    ❑ Product suite provides secure data transfer, authentication using adapters to data stores (LDAP, AD, etc.) Administrator's can configure ACLs (Access Control Lists) to enable permissions (authorization), roles, profiles and assign them to users or user groups. The security module also integrates with SSO products (SiteMinder, Oracle, etc.)

    ❑ Security can be enabled to define different levels of access like UI security, data security, process security to provide authentication and authorization capabilities to different application components and the underlying data.

Business Orchestration Layer
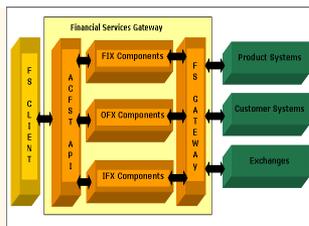
- Enterprise Financial Services
- Enterprise Risk Services
- Governance Services
- Compliance Services
- Corporate Reporting

Service Layer
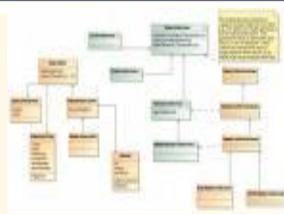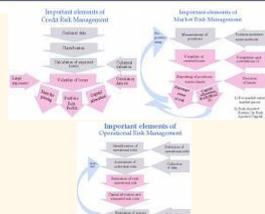
- Data Collection
- Credit /Market / Operational Risk
- Reconciliation Services
- Business Activity Monitoring
- Operational Reports
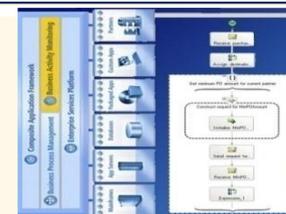
Application Layer
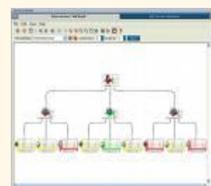
- Integration Service
- Rules Service
- Business Process Management
- Accounting
- Enterprise Risk
- Basel II Service
- Administration / Scheduling / Security / Reporting
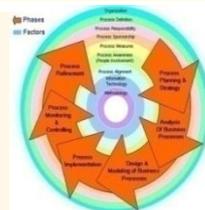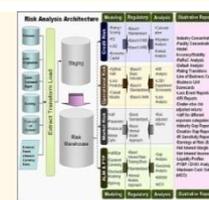
Vertiv Application Architecture

Input

- Batch Data OPs, Files, xml, Fixed, Delimiter
- Real Time Data Trade Order, POs, Messages, Events
- Streaming Data Market Data, Bloomberg, Reuters

Vertiv Engines

Integration Services

Batch Integration
- Reference Data
- Product Processor Data
- Finance and Risk Data
- Files
- Database

Complex Event Processing
- OMS
- Market Data
- Settlements
- Event Based Feeds
- Alerts

Feed Handlers
- FpML
- FIX
- ISO
- FX rates

Rule Engine

Cache

Object

Relational
- Instrument Pricing
- Portfolio Pricing
- Market Risk
- Credit Risk
- Liquidity Risk
- Intraday Risk

Complex Event Processing
- Real-time Pricing
- Real-time Risk
- Desk Level Portfolio VaR
- Portfolio P&L

Memory Store
- Enterprise Risk
- Back Testing
- Operational Risk
- End of Day P&L
- Accounting
- BASEL II Analytics

Distribution Services

- Reports
- Dashboards
- Downstream
- Applications
- External
- Street

Output

- Front Office Applications and Trading
- Real time consolidated Risk and Pricing

- Middle Office Applications ERM & Finance Mgt.
- Management/Finance reporting. P&L and Balance Sheet

- Back Office Compliance & Regulatory
- SEC, BASEL II, IFRS, GAAP, OCC, ECB, FSA

Business Process Management, Business Activity Monitoring

Meta Data, Reference Data Repository

Security Management

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Application Components

Application Features

    Scalability

    Traceability and Lineage

   Stress Testing Support

    Adjustment Functionality

Summary

Appendix

- ❑ Minimized trucking of data ensures scalability
- ❑ Two stage approach for regulatory reporting ensures minimized data movement and enhanced performance
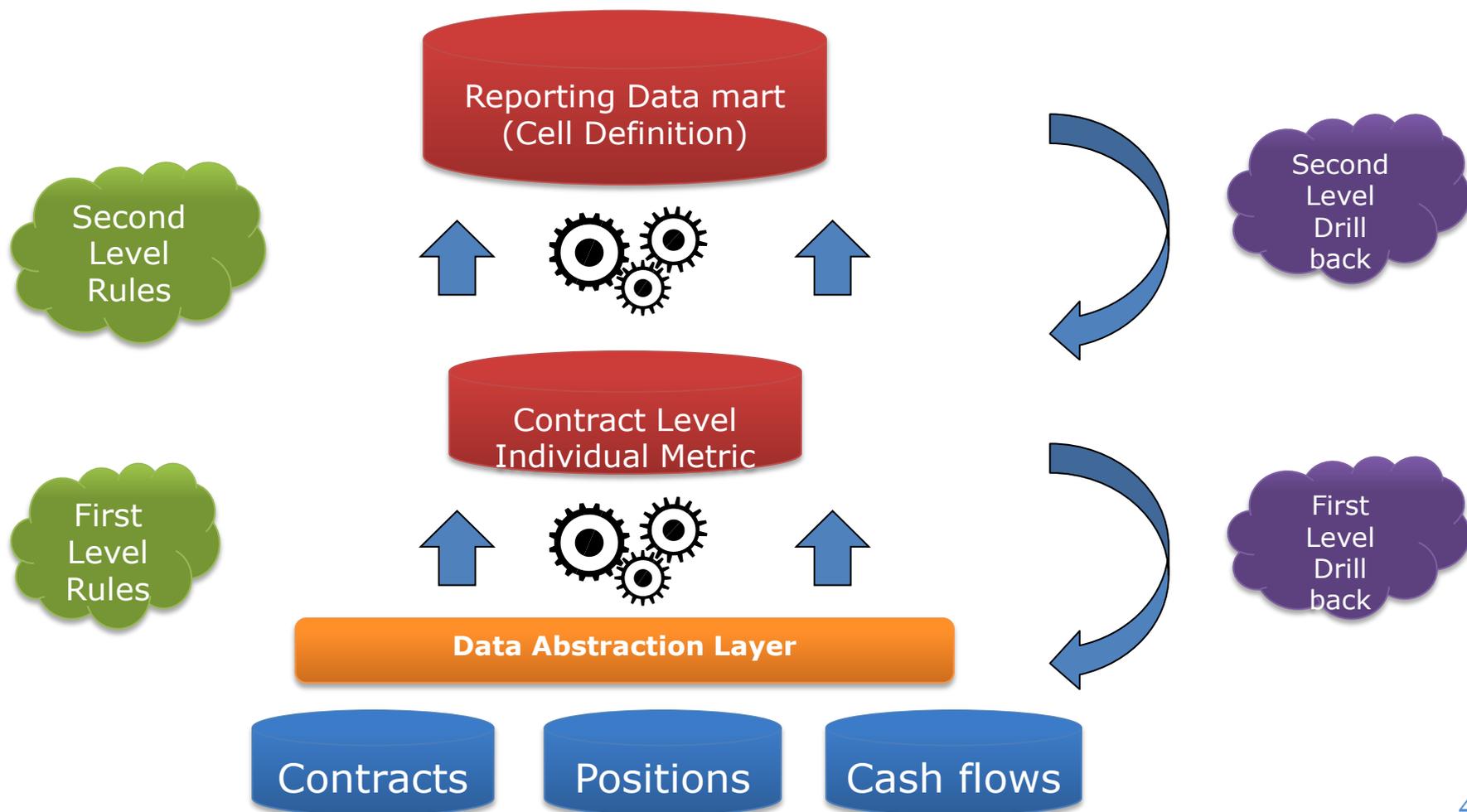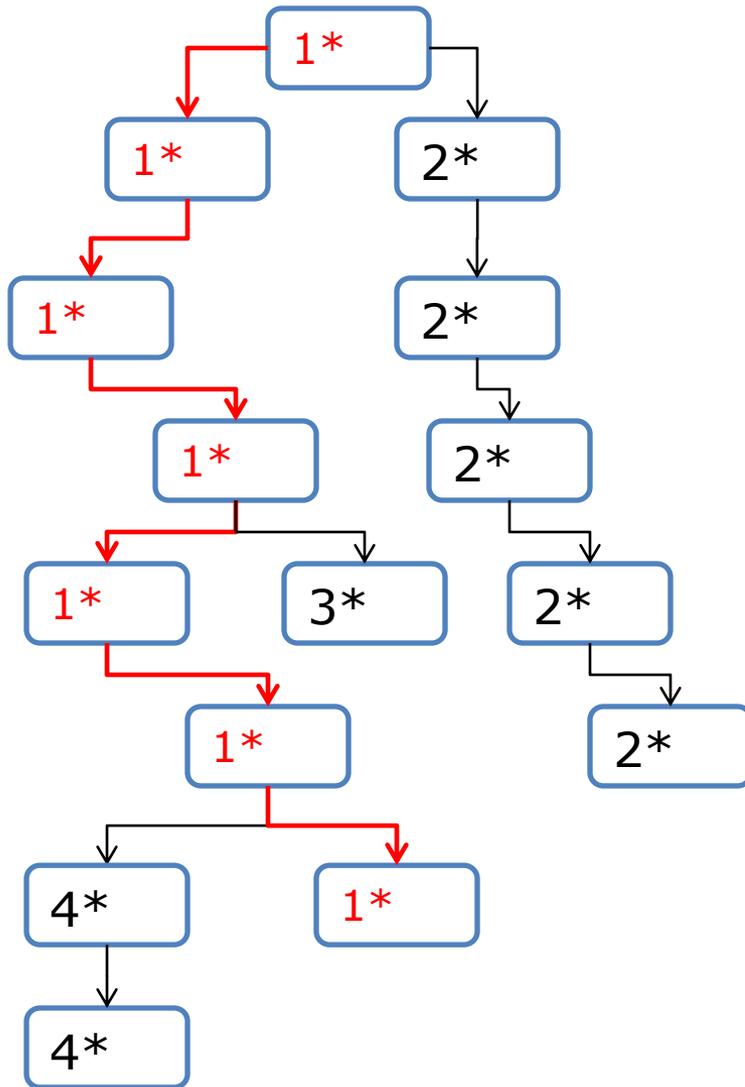
- Data lineage
  - Transformation **PATH** from source to target is always maintained

- Drill back
  - Intermediate **VALUES** at various stage are also maintained from source to target Identify sources of potential liquidity strain

- Ensures complete traceability and lineage for reconciliation and auditing requirements

❑ Extensive Stress tests support to

- ▪ Identify sources of potential liquidity strain
- ▪ Ensure liquidity exposures are within limit
- ▪ Identify impact on pricing assumptions

❑ The impact of liquidity stresses assessed on banks'

- ▪ Cashflow
- ▪ Liquidity position
- ▪ Profitability
- ▪ Solvency

❑ Stress test consideration parameters

- ▪ Short term and protracted scenarios
- ▪ Company specific and market wide scenarios
- ▪ Combination of two above

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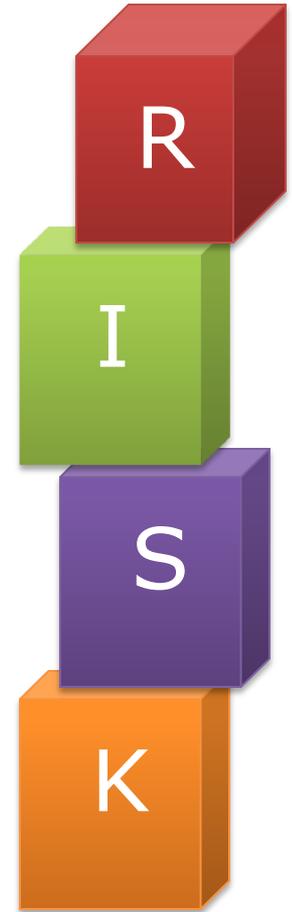
❑ Robust Adjustment Module

- ▪ Adjustments can be made at various stages of report gen

- ▪ Adjustments can be applied to other reports

- ▪ Adjustments are version controlled and audit trail generated

- ▪ Updating transactions supported for privileged users

Contractual	Spot	Open maturity	< 1wk	1wk -1m	1m-3m	3m-6m	6m-12m	>12m
Total Assets	110	20	10	30	55			
Total Liabilities	70	30	~~10~~			200	250	400
Off Balance Sheet Liquidity	20							

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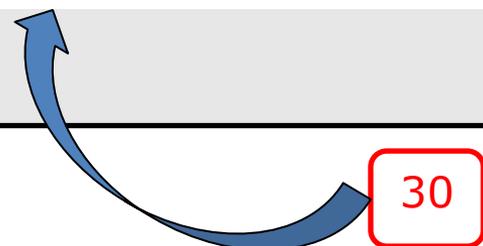
Contractual	Spot	Open maturity	< 1wk	1wk -1m	1m-3m	3m-6m	6m-12m	>12m
Total Assets	110	20	10					
Total Liabilities	70	30	20					
Off Balance Sheet Liquidity	20							
Mismatch	-20	10	10					
Mismatch as % of total Assets	-18%	50%	100%					

- Dimension rich data mart supports management reporting
- Time-series analysis and financial functions supported

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❑ FINQUEST is ideal product for

    ❑ Trade data capture from several source systems

    ❑ Accounting, Trade Ledger and Reconciliations

    ❑ Liquidity Management

    ❑ Regulatory Reporting

❑ FINQUEST provides:

    ❑ Real-time configuration of rules and reports

    ❑ Real-time trace-back and lineage support

    ❑ Robust stress testing support

    ❑ Adjustments functionality

❑ FINQUEST address challenges of

    ❑ Capturing Trade level data and prepare trade ledger

    ❑ Configurable rule driven approach to match ever-changing regulations

    ❑ Centralized accounting and auto-reconciliation

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▶ **Appendix**

  FINQUEST Edge

  Implementation Methodology

FINQUEST ™ Edge

Dimension	Traditional Rule Engines	Vertiv FINQUEST
Methodology	Processed one row at a time - slow	Many rows can be processed at a time
Execution	Java/C++ Based	SQL, CCL based
Processing Mechanism	Out of procedure • Longer Times (Latency) • Resource intensive	In place data processing • No data hops • Faster processing
Rule Storage	File based	DB based
Suitability Scenarios	Broadly varying rules • Retail Industry • Insurance Sector	Rules of similar nature • Aggregations • Summaries • Roll-ups
Processing Capacity	Few hundreds row transformations / sec	500K to 1 Million row transformations / sec

Dimension	Traditional Rule Engines	Vertiv FINQUEST
Infrastructure Scalability	Low-medium • Clustering • Grid / Cloud	Highly Scalable • Vertical • Horizontal
Processing choice	Possible Limitations	Diverse • Real-time (CEP) • Intra-day (Cache) • End-of-day (DB)
Utilities	Standard • Scheduler • Entitlements • Design/Debug and Production modes	Standard • Scheduler • Entitlements • Design/Debug and Production modes Advanced • Tree Manager • Business Object Repository

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- Definition Phase
    - Define Liquidity Reporting Requirements
    - Define and Build Liquidity Reporting Business Case
    - Define solution architecture
    - Define implementation delivery architecture
    - Define Liquidity Reporting data architecture
    - Define Integration architecture
    - Define technical architecture
    - Define test approach

- Design/Development Phase
    - Design Liquidity Reporting Requirements Mapping
    - Conduct Fit Gap Analysis
    - Design Complete Solution Including Gaps
    - Design information delivery solution
    - Build and unit test information delivery solution
    - Design and build data stores
    - Design Integration solution
    - Build and unit test Integration solution
    - Develop test cases (integration, system and UAT)

- Testing Phase
    - Execute integration test cycle
    - Execute system test cycle
    - Execute UAT test cycle
    - Dry run with External organizations FSA, and ECB

- Deployment Phase
    - Migrate code and Data to Production instance
    - Configure and Deliver Production processes
    - Transfer control over the system to Operational and Business Teams
    - Prepare for Product Readiness
    - Integrate and Activate DR Instance
    - Move to Production