CIBC RSI

RSI Overview Deliverables

❶**Market Risk** General MR, IRC, Equity & Debt Specific Risk, Stressed VaR, Stress Testing ❷**Trading Credit Risk** CVA, Limits Monitoring, Stress Testing, Master Agreement Details, Pre-Deal Check, Ratings Maintenance ❸**Trading Operational Risk** Product Authorization, Limit Breaches, KRIs, Reporting ❹**Analytics** VaR Methodology, Stress Testing, Model Calibration, Exposure Modeling ❺**Economic & regulatory capital** IRC enhancement ❻**Data/ reporting** Data quality, Master data management, Derived historical data, Unstructured data management, Standard/ad hoc reporting/analysis, Meta data

Risk Model & Sensitivities

❶**DGVRT** assumed MR factors log-normally distributed; statistical parameters based on 250 days of history; inputs (risk factor sensitivities, correlations, volatilities, average returns, market prices of risk factors) ❷**HistSimm** based on historical distribution of rolling 500 daily changes in risk factors ❸**Debt Specific Risk DSR** default + idiosyncratic spread risk - MC model with 4 components: 1 *Marginal distribution calibration* to estimate/ calibrate spread return for each credit group 2 *Correlation calculation* 3 *Preprocessing 4 Core* ❹**Approach** Use *spread simulation model;* small spread moves ⇨ spread *volatility risk*, larger moves ⇨ *migrations and defaults*; models **total credit spread** of individual bond as general spread + specific component; **general spread** from bond index given by observable index or inferred as average credit spread of basket of bonds comprising a Credit Group; **specific spread** component = difference between total credit spread inferred from bond's observable price and sectorial spread; use 90 Credit Groups of bond indices, baskets of traded bonds, spanning markets, economic sectors, credit qualities maturities; use MC simulation to compute specific risk; join marginal distributions using copulae to model tail dependence embedded within credit spread data; model sector and specific spread distributions using Student's t-distributions; calibrate historical bond index data to obtain distribution parameters via moment matching **Risk sensitivities (45)** equity/ metal/ oil/ FX DGVRT, duration e.g. *base metal vega risk*, *CS idiosyncratic risk*

Interest Rate Risk

❶**IR Outright and Curve risk** portfolio sensitivity to changes in yield curve (Frontier/ Voyager zero rate yield curves for sensitivity, VaR generation) ❷**IR Swap Spread risk** portfolio sensitivity to changes in spread between govt yields and swap yields ❸**IR Vega risk** sensitivity to changes in IR volatilities ❹**Total IR risk all IR risks + IR Theta** with correlations between IR components (zeroes, swap spreads, volatilities)

Credit Spread Risk

Due to change in spreads (bond index, government yields) ❶**Generic CS risk** change in spread (Treasuries, mapped bond index) ❷**Idiosyncratic CS risk** change in spread (specific issuer, mapped index) ❸**Total CS risk = Generic CS risk + Idiosyncratic CS risk** assuming zero correlation

Analytics

Analytics OLSM

(Optimized Least-Squares Monte Carlo) simulation to compute **potential future exposure (PFE) profile** of derivatives with complex optionality for which no analytic approximation exists; relies on **Least-Squares approximation** by Longstaff & Schwartz; traditionally **nested Monte Carlo MC** or **approx surrogate structured deal** computationally expensive & approximate **work streams** *IR & FX basis risk, Equity Dividend, Volatility Skew, Monte Carlo on Monte Carlo* **correlation risk** *equity-equity, commodity-commodity, commodity-FX* assets classes **dividend risk** measured through sensitivity based variance-covariance; *calculated for 1 bp change in dividend yield, applied to shocks based on dividend yield volatilities; dividend yield volatilities for indices based on time series of forward dividend yields and dividend yield volatilities for single stocks*

📖**Analytics Model gaps**

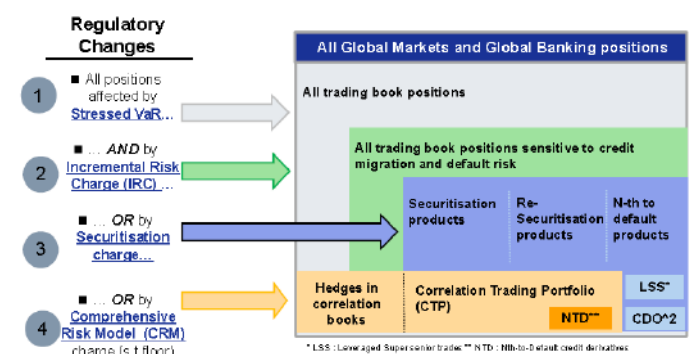## Market Risk

Market Risk Data

❶**Data groups** **IR market data** Yield/zero curves for bonds, swaps (zero curves bootstrapped from corresponding yield curves), spread curves, volatility cubes or surfaces, basis spread curves **Trading credit** CDS spreads, CDS indices **FX related** FX spot rates, FX volatility surface **EQ related** equity indices, common stock prices; equity volatility surfaces **Commodity related** commodity spot prices, commodity forward/future price curves, commodity price volatility surfaces ❷**Data structures** **Scalar asset spot prices** FX spot prices, equity spot prices, commodity spot prices bond prices **1-dim term structure curves** (1-dim vector data) IR yield/zero curves, IR spread curves, CDS spread curves, commodity forward/futures curves, ATM FX implied volatilities, commodity price volatilities, ATM equity implied volatilities **2-dim surfaces** ATM IR implied volatility surfaces, equity implied volatility skews, FX implied volatility skews **3-dim cubes** IR implied volatility skew cubes **Matrix market data** correlation metrics, transition probability metrics ❸**Trade data** **Instrument** (security term & conditions, Security, Debt, Option, Future, Forward) **Instrument Type** (product type) **Trade** (daily trade position information) **Structured Product**, **Cash Flow**, **Schedule** (average rate schedule, payment Schedule, reset schedule, amortizing schedule, exercise schedule) **Instrument state** (daily basis 'NEW', 'SG_DONE', 'SG_RESULTS_LOADED') ❹**CIBC MHS (market data store)** central repository for Voyager (market risk minus specific risk), Euclid (specific risk), TRACS (credit risk) ❺**Types** 1-market data 2-variance/ covariance (derived market data) 3-statistical parameters (derived market data) ❻**Feeds** generates 76 market data feeds (34 feeds in MR) 30+ FO systems (1 feed 1 system)

Incremental Risk Charge (IRC)

❶**What?** Loss due to default/changes in quality at 99.9% CI over 1 year ❶**Phase 1** MC simulation of *Merton structural model* for default/credit migration **Phase 2** MC simulation of credit/equity states based on *Stochastic Volatility model* (stochastic price + variance process driven by Brownian motions with constant linear correlation) ❷**Phase 1 design** ①Parameterize correlation with concentration parameter to couple issuer/ market concentrations to migrations and defaults ②Constant level of risk (same loss distribution over liquidity horizon 3 months liquid within 1 year horizon) ③Aggregation/liquidity horizon correlation – use hedge for sub-portfolios with multiple liquidity horizons ④Valuation – principles (full valuation; same valuation by front and risk); for equities no model needed (prices simulated directly) ❸**Credit Spread & Mark-To-Market Adjustment** - 2 credit spread types: ①CDS spread: bond spread, can differ in magnitude for technical reason; ②Bond spreads: yield spread, asset swap spread, option adjusted spread (OAS or Z-spread), interpolated spread (I-spread) available on Bloomberg ❹**Plan** ①Contingency (standardized approach) ①Risk model (requirement, development, unit test) ②Market data (requirement, document, unit test) ③Trade position data (requirement, development, unit test, SIT, UAT, Regression) ❺**Gap analysis** ①Products (structured credit run-off portfolio) ②Position data (instrument type, business entity for aggregation -- insufficient id of securitized position, parallel effort to standardize DSR treatment, banking book/ securitization treatment) ③Market data (credit spreads per currency/sector/rating - insufficient sector coverage, better granularity)

Regulatory changes

Metrics to calculate regulatory capital for market risks

	General Market Risk	Specific Market Risk
'Ordinary' Trading Book Positions	$VaR_G + S\text{-}VaR_G$	$VaR_S + S\text{-}VaR_S$ (equity issuer and prepay risk)
'Linear' Traded Credit Products (CDS, Indices)	$VaR_G + S\text{-}VaR_G$	$VaR_S + S\text{-}VaR_S + IRC$
Securitisation Positions and N^{th}-to-default Credit Derivatives	$VaR_G + S\text{-}VaR_G$	Market Risk Standard Approach
Correlation Trading Portfolio	$VaR_G + S\text{-}VaR_G$	CRM

IRC Tactical
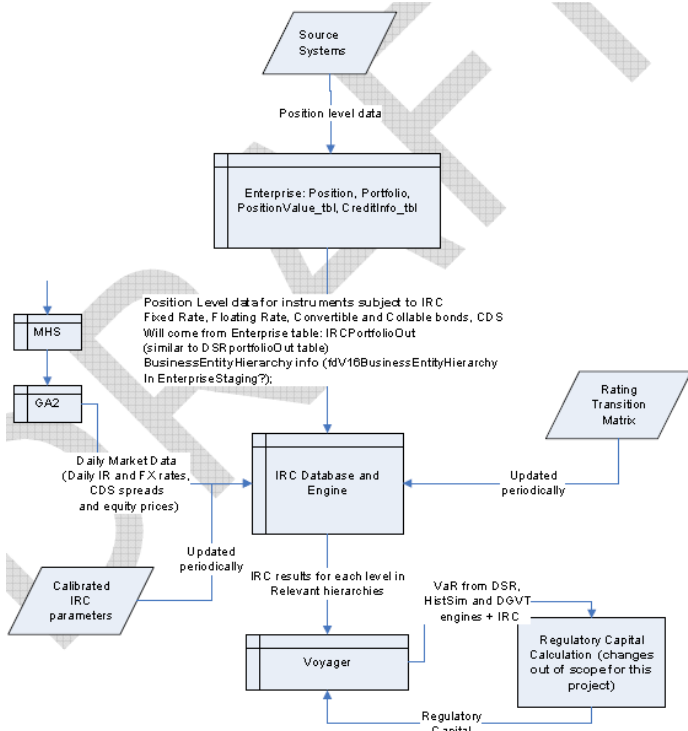
❶**Engine** calculate *default risk* + *credit migration risk* that are incremental to risks captured in current VaR ❷**Trade Position Feeds** leverage existing data feeds augmented with extra data elements ❸**Market Data** new feed for CDS spread data ❹**Reporting** Regulatory Capital calculation incorporated with new charge ❺**Hardware** engine to run independently but integrated to existing environment ❻**Operation** improve existing operational procedure to monitor and report

Requirements IRC

❼Track Credit Migration + Defaults of underlying & counterparties ❶**Multiple liquidity horizons** (3 months - 1 year, time to sell/hedge in stressed market) ❷**Cover position** subject to capital charges for specific IR risk ❸**Include/exclude** all listed equity, derivative positions, securitization positions ❹**Impact of correlations/ clustering** between default and migration events (higher capital charge for concentrated portfolio, concentration under stressed conditions) ❺**Exposures on non-netted basis** (excepted long/ short positions on same instrument) ❻**Basis risks** (by product, capital structure, rating, maturity, vintage, payout trigger) ❼Impact of potential risks between **maturity & liquidity horizon**, **default risk**, **impact of optionality** from price changes ❽**Constant level of risk modeling** ❾**Correlation & diversification** between multiple obligors and obligor/ market risk factors ❿**Risk mitigation & netting effects** as required ◆credit migration risk ◆credit spread risk ◆equity price risk ◆IRC at a 99.9% CI, over a 1 year time horizon ◆age a portfolio of trades for up to a 1 year period ◆Re-investment logic at end of liquidity horizons to positions that will mature/roll-off during portfolio aging function

Stressed VaR

❼**What?** Measure VaR due abnormal market behavior during selected time period ❶**Approach** ①Use existing models with current risk factor levels & current portfolio ②Substitute [current risk factor volatilities & correlation structure] ➔ those from historical period with greatest VaR for portfolio ③For *historical approach* supplement actual historical returns with antithetic returns ④For *simulation approach* replace marginal & joint risk factor distributions in production ➔ those inferred from historically stressed period ❷**General Market Risk (GMR)** ①Based on historical state changes from stressed period, sensitivity-based portfolio valuation & current aggregation structures ②Augmented by antithetic sampling & risk shocks at individual risk factors **Data**: use data with current systems; require time series of risk factors (interest rates, spreads, prices, implied volatilities, etc.) in order to generate *historical shocks* ❸**Equity Specific Risk (ESR)** ①Based on decomposition of historical state changes from stressed period into *general* and *specific* components BUT use *static* set of regression indices (instead of *dynamically* assigning indices) to make general market risk comparable from one day to next ②Use only 2 indices (1 country index + 1 country/ regional sector index) ❹**Debt Specific Risk (DSR)** ①Use historically sampled spreads to compute spread volatility & default risk ②Use historical changes in spreads + credit spread sensitivities to construct P&L distributions during stressed periods **Data** (current) historical market spreads (total spread of basket of bonds) based on time series of bond index spreads + information on total spread for each Credit Group; BUT no historical information on total spread at issuer level (historical data on total spread for basket of bonds, but not for individual bonds)

Requirements Stressed VaR

①Calculate stressed PVs & greeks using full revaluation ②Shock tenors instantaneously or over extended periods ③Shock spread curves instantaneously or over extended periods

④Simulate dynamic portfolio rebalancing ⑤Replace designated trades that roll off during stress simulation with new trades per requirements (e.g. delta-hedged portfolios) ⑥Shock curves via parallel or non-parallel shifts of curves and volatilities ⑦Create stress scenario from historical market data moves by choosing start/end time
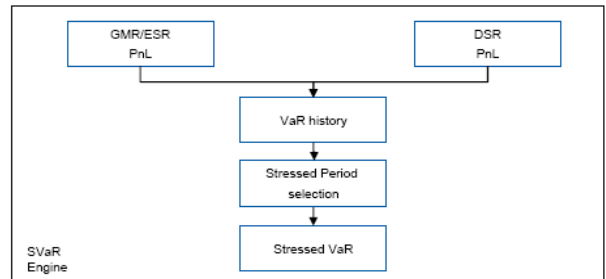

Figure 10. Stressed VaR framework overview

Stressed VaR Tactical

❶**Engine** No new engine; DGVRT Parametric Model used as Phase I with calibration applied to stress period's volatilities ❷**Trade Position Feeds** No new position data is required ❸**Market Data** No new market data required but need to increase the length of the series in database to support "stressed" period selection ❹**Reporting** new report ❺**Hardware** no new hardware ❻**Operation** improve existing operational

VaR, IRC, Stress test Performance

Back testing

❼**What?** Compare theoretical VaR against actual P&L ❶**Basel framework** periodically compares portfolio or asset's daily VaR against daily P&L; model to generate the times of VaR exceeding P&L equal to (1-alpha) * time periods for back testing ❷**Basel 3 zones** ①**Green Zone** - 0 to 4 adverse exceptions out of 250 - no add-on factor ②**Yellow Zone** - 5 to 9 adverse exceptions out of 250 - add-on factor of from 0.40 to 0.85 ③**Red Zone** - 10 or more adverse exceptions out of 250 - add-on factor of 1.00 ❸**Standards** ①**Bank level** aggregate risk and risk by asset class measured by models used in capital adequacy calculations ②**Daily back testing** results at business & desk levels reported to CMRM management & line management; alert to new or unaccounted-for risks; routine quality controls for risk models and systems ③**Report adverse SPL exceptions** at bank-level to OSFI within 1 business day ④**Monthly analysis of SPL** results submitted to OSFI for review ⑤**Backtesting exceptions** and average divergence (average difference between absolute value of SPL & VaR for all adverse exceptions) at bank-level ➔reported to OSFI quarterly through Basel Capital Adequacy Return schedule 42 ⑥**Backtesting comparison** corresponds to structure of VaR limit hierarchy ⑦**VaR comparisons** against next day's changes in static portfolio P&L (SPL results reviewed periodically against actual P&L) ⑧**Exceptions at CIBC and business levels** (Tier 1 + Tier 2) validated, explained, documented, reported to senior management ⑨Backtesting results + exceptions available to internal/ external auditors ❹**General Methodology SPL** = P&L due change in market parameters, with positions being held constant - **Valuation methodology** ①Value portfolio using Day 1 market parameter ②Revalue same portfolio using Day 2 market parameters ③SPL = change in portfolio value - **SPL generation process** ①Obtain greeks for Day 1 ②Obtain Day 1 + Day 2 market parameters ③Calculate change in market parameters between Day 1 + Day 2 ④Compute SPL for Day 2 using change in market parameters and greeks ⑤For each individual desk, calculate SPL at greeks level by each appropriate risk factor ❺**Market Risk Methodology** calculate MR SPL by taking Day 1 trading positions, as represented by the greeks, and actual market movements between Day 1 and Day 2. Basic formula based on Taylor series: **SPL = Σ over all instruments [δ* ΔS+ (1/2) Γ* (ΔS)2]+ ν*Δσ+ Θ** where SPL = 1-day change in portfolio value with positions held constant; ΔS = day

over day change in price of underlying; δ(delta)/ Γ(gamma) 1st/ 2nd -order marginal sensitivities; v (vega) = 1st order marginal sensitivity of instrument price to volatility (σ) of price of underlying, Ө (theta) = 1-day change in portfolio, or measure of *time decay*, assuming no change in market prices ❻**Equity Specific Risk** back-tested against portion of SPL related to equity specific moves (market and specific SPL split for given move in price of particular equity, table containing betas for such equity to relevant industry sectors and/or indices generated on a regular basis for DGVRT VaR) ❼**Debt Specific Risk** indirect approach. Formula: **DSR_PL(t+1,t) = Total PL(t+1,t) - GGM_PL(t+1,t)** for each position where Total PL(t+1,t) = total P&L changed = change in mark-to-market price between day t+1 and day t, GGM_PL(t+1,t) = gross general market (GGM) P&L, which includes P&L impact of changes in all underlying market factors. Hence DSR P&L = DSR_PL(t+1,t) consists of P&L components not explained by GGM P&L ❽**Net Trading Related Revenue (NTRR)** excludes "Other" trading revenue (Total trading revenue = NTRR + Other trading revenue), NTRR = trade date based-MTM revenue from trading businesses driven by market movements; components of total trading revenue not included in NTRR: Sales and commission income, Changes to reserves, Changes to valuation adjustments, New business revenue including inception revenue and fees

EOD Feed schedule
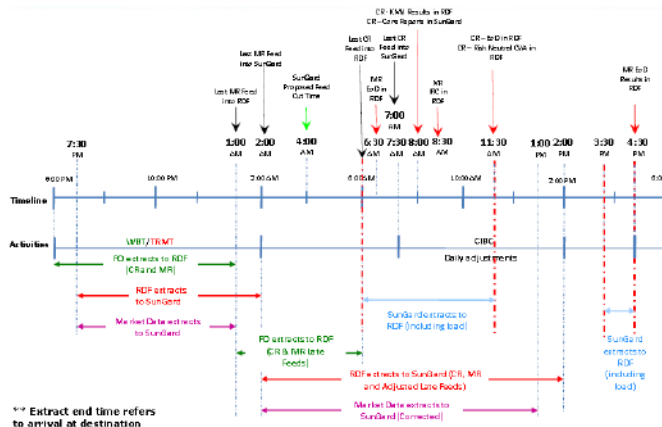
Enhanced VaR Tactical

•VaR Calculation tools for new sensitivities (IR Basis, Equity+ Commodity Skew Vega, Dividend, Correlation Sensitivities) •Reporting •Operational Procedures
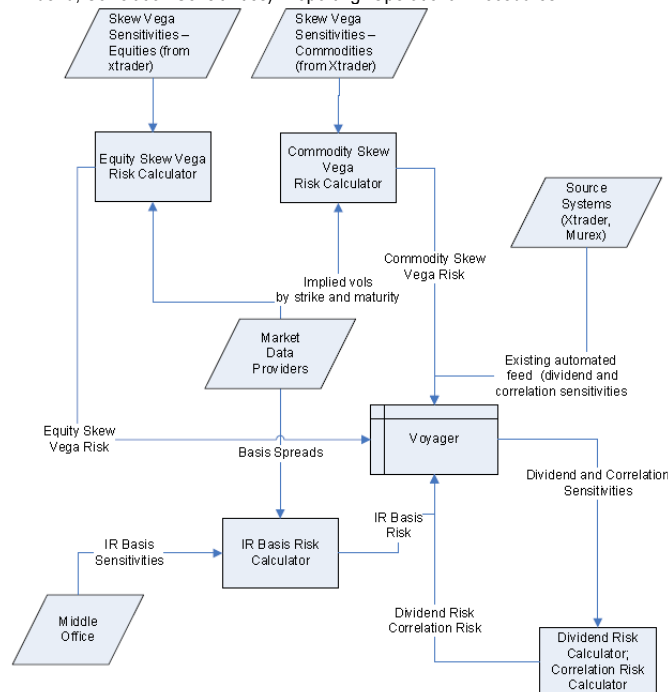
IMA (Internal Model Approach) *Documents to be submitted*

❶Market risk policies (describe framework) ❷Organization structure (independence/ segregation of duties) ❸Measurement systems (describe methodologies & models) ❹Stress testing program (selection methodology for scenarios) ❺Back-testing program (previous year's results, exceptions) ❻Technological environment (diagrams, processes) ❼Limits structure (hierarchical structure, approvals) ❽Management information systems (regular & ad-hoc reports) ❾Databases of relevant information (time series of risk factors, P&L) ❿Reports of independent assessments (internal/ external audit) ⓫Estimation regulatory capital (SMM + IMA) ⓬Description exposures (by product & risk factor)

OSFI Initiatives

Business Case

❶Develop & implement new **business/ risk framework** including capital models required to meet new IRC and MRA guidelines by OSFI for December 2010 ❷Develop *Capital Contingency plan* required by OSFI including *capital impact assessment* with consideration to use of multipliers or standardized approach in the worst case scenario that OSFI does not approve CIBC's IRC and MRA enhancements.

Project Steering Committee Liam Mason, Matt Willis, Melody Glover, Greg Frank
Advisory Pankaj Agarwal (Finance-Reporting Division) Robert Kowara (Internal Audit) Spiro Daoussis (Risk Management - Credit Risk Analytics) Laurie Russell (Risk Management — RSI Project)
Overall Project Director (PMO) Lily Leung
Work stream Business Lead ◆**IRC** Tim Xiao ◆**MRA/Stressed VaR** Rina Shklyarman ◆**MRA/Enhanced VaR Measures** Matt Willis ◆**Securitized Products, Illiquid portfolio** Tim Mills ◆**Contingency Plan** Michael S Lau ◆**OSFI Governance** Melody Glover

Plan

IRC Project	3-Aug-09	3-Jan-11
Contingency Plan (Standardized Approach & Impact Analysis)	5-Oct-09	31-Dec-10
Risk Model (Requirement, Development and Unit Testing)	3-Aug-09	29-Jan-10
Market Data (Requirement, Development and Unit Testing)	14-Aug-09	30-Dec-09
Trade Position Data (Requirement, Development and Unit Testing)	14-Aug-09	30-Dec-09
System Integration (SIT) Testing	1-Feb-10	14-Mar-10
SIT Sign-Off by Technology	14-Mar-10	14-Mar-10
User Sign-Off for UAT Promotion	15-Mar-10	15-Mar-10
User Acceptance (UAT) Testing	16-Mar-10	3-May-10
User Sign-Off for Regression Promotion	2-May-10	2-May-10
Regression	4-May-10	31-Dec-10
OSFI Related Deliverables		
Submission of Pre-Application Package	31-Aug-09	31-Oct-09
Submission of Final Application Documentation to OSFI	1-Nov-09	30-Apr-10
Gap Analysis Meeting #1 (with OSFI)	31-Jan-10	31-Jan-10
Submission of Parallel Testing (20 Days)	1-May-10	31-Aug-10
Interim Approval from Vetting & Audit	16-Jan-10	15-Apr-10
Gap Analysis Meeting #2 (with OSFI)	31-Jul-10	31-Jul-10
Final Approval (Vetting & Audit)	1-Jun-10	15-Aug-10
OSFI's Interim Approval Decision	31-Oct-10	31-Oct-10
OSFI 's Final Approval Decision	31-Dec-10	31-Dec-10
User Sign-Off for Production Promotion	31-Dec-10	31-Dec-10
Production	3-Jan-11	3-Jan-11
MRA	**3-Aug-09**	**3-Jan-11**
All Deliverables		
Submission of Pre-Application Package	31-Aug-09	31-Oct-09
Submission of Final Application Documentation to OSFI	1-Nov-09	30-Apr-10
Gap Analysis Meeting #1 (with OSFI)	31-Jan-10	31-Jan-10
Submission of Parallel Testing (Stressed VaR 20 Days & Enhanced VaR 60	1-May-10	31-Aug-10
Interim Approval from Vetting & Audit	16-Jan-10	15-Apr-10
Gap Analysis Meeting #2 (with OSFI)	31-Jul-10	31-Jul-10
Final Approval (Vetting & Audit)	1-Jun-10	15-Aug-10
OSFI's Interim Approval Decision	31-Oct-10	31-Oct-10
OSFI 's Final Approval Decision	31-Dec-10	31-Dec-10
User Sign-Off for Production Promotion	31-Dec-10	31-Dec-10
Production	3-Jan-11	3-Jan-11
Stressed VaR	**15-Sep-09**	**3-Jan-11**
Analysis & Impact Analysis	15-Sep-09	31-Oct-09
Detailed Methodology and Supporting Details	1-Nov-09	28-Feb-10
Detailed Requirements for Technical Implementation	1-Nov-09	15-Jan-10
Development	16-Jan-10	30-Mar-10
System Integration (SIT) Testing	1-Apr-10	30-Apr-10
SIT Sign-Off by Technology	30-Apr-10	30-Apr-10
User Sign-Off for UAT Promotion	30-Apr-10	30-Apr-10
User Acceptance (UAT) Testing	1-May-10	30-May-10
User Sign-Off for Regression Promotion	30-May-10	30-May-10
Regression (20 days)	1-Jun-10	30-Jul-10
Enhanced VaR (Spreadsheet tools solution)	**3-Aug-09**	**3-Jan-11**
Detailed Methodology and Requirements	20-Sep-09	15-Jan-10
Tool Development	1-Dec-10	15-Mar-10
System Integration (SIT) Testing	16-Mar-10	30-Mar-10
SIT Sign-Off by Technology	30-Mar-10	30-Mar-10
User Sign-Off for UAT Promotion	30-Mar-10	30-Mar-10
User Acceptance (UAT) Testing	1-Apr-10	30-Apr-10
User Sign-Off for Regression Promotion	30-Apr-10	30-Apr-10
Regression (60 days)	1-May-10	30-Jul-10
Exponential Weighting and Scaling Factors	**3-Aug-09**	**3-Jan-11**
From Analysis to UAT Sign-Off	3-Aug-09	31-Oct-09
Regression Set-Up	1-Nov-10	15-Nov-10
Regression (60 days)	16-Nov-10	31-Jul-10

Work streams

		PROPOSED OSFI 2010 Initiatives Total Resource									
	Project Name	Group	Q1 2010	Q2 2010	Q3 2010	Q4 2010	Q1 2011 (Nov + Dec 2010)	Total Man Months	Total Project Cost (CAD)	FY2011 (Jan-Oct)	Post Implementation Ongoing Cost (10 months)
1	OSFI 2010 Initiatives (IRC)	Analytics	4	4	2	2	2				
		MRM	1	1	1	1	1				
		Total	5	5	3	3	3	54	885,600.00		164,000.00
2	OSFI 2010 Initiatives (MRA) Stressed VaR	Analytics	1	1	0	0	0				
		MRM	2	2	2	0	0				
	Enhanced VaR (Expon. Weighting & Scaling Factor)	Analytics	1	1	0	0	0				
		MRM	4	4	2	2	2				
		Total	8	8	4	2	2	70	1,148,000.00		328,000.00
3	OSFI 2010 Initiatives (Securitization + Illiquid Portfolio)	MRM	2	2	2	0	0				
		Total	2	2	2	0	0	18	295,200.00		
4	OSFI 2010 Initiatives (Contingency Planning)	MRM	2	2	1	1	1				
		Total	2	2	1	1	1	20	328,000.00		
5	OSFI Governance Framework	MRM	2	2	2	1	1				
		Total	2	2	2	1	1	23	377,200.00		
6	Project Management	PM	1	1	1	1	0				
		PCO	1	1	1	0	1				
		Total	2	2	2	1	1	23	377,200.00		
	Overall		21	21	14	8	8	206	3,411,200.00	492,000.00	492,000.00
	Add 10% Contingency				FY10 FY11			192 16	3,752,320.00	541,200.00	541,200.00

Work stream	Mandates
IRC	Develops/ implements new IRC model & other related initiatives **BCBS guidance for "Guidelines for computing capital for incremental risk in trading book"**, (IRC) Jul 09
MRA	Develops/ implements Stressed VaR, Enhanced VaR, exponential weighting, volatility scaling factor - **BCBS guidance "Revisions to Basel II market risk framework", (MRA) Jul 09**
Securitized Products, Illiquid Portfolio	Develops new business/operational framework within Capital Markets, Securitization Work Stream, Chief Accountants to support new capital treatment for securitized product & treatment for illiquid positions (BCBS-MRA guidelines Section VIII)
Contingency Planning	Develops impact analysis from above initiatives to Senior Management of the Bank and OSFI. Contingency plan should consider standardized and multiplier approach in worst case scenario of non approval for IRC and MRA applications and capital plan work with Capital Management Team that links the contingency plan to the overall capital plan of Bank
OSFI Governance	Develops/ implements new OSFI compliant framework across project and work streams e.g MIOC approach; completed and resolved self assessment gap analysis. Works with PMO through preparation of all key deliverables into OSFI

Credit Risk

Requirements

◆**Methodology framework & Regulatory calculation** based on ❶Basel II AIRB factor based/credit exposure measurement (for parallel run) ❷Monte Carlo Simulation using Internal Models for regulatory approval ◆**Counterparty Credit Risk Exposure** + **CVA measurement f**or OTC derivatives & Repo-style transactions ◆**Contingent & Credit exposure** measurement for Repo-Style transactions ◆**Direct Credit Exposure measurement** ◆Credit derivative reference assets ◆Negotiable paper ◆Certificate of deposits ◆Fixed deposits ◆**FX Settlement Risk Exposure measurement** (FX and XCCY Swaps) ◆Credit Stress Testing & Sensitivity Analysis ◆Credit Exposure Limits Management & Limit Excess Workflow Management & Limit Excess Reporting ◆Pre-deal /trade credit limit check & what-if analysis ◆Counterparty Maintenance ◆Netting & Collateral Agreements ◆Document Management & Tracking ◆Regulatory, Management / Credit Economic Capital Measurement & comprehensive Reporting ◆**Wrong Way Exposure** & risk measurement ◆**Portfolio Analysis** in production ◆**Security Administration & Audit functionality** ◆**Ageing/Stale calculations** for Wholesale Banking products & all market and reference data for ◆OTC derivatives & Repo-style transactions for contingent credit exposure measurement ◆Fixed Deposits ◆Negotiable Paper e.g. Credit Derivative reference assets + loans ◆Collateral pledged/received + pledges to exchanges

Credit Risk Use Case

◆**Simplified credit, market and liquidity risks** High level (p. 3) ◆**Market data analysis** (Market Data Manager) (p. 7) ◆**Determine/ calibrate simulation parameters** (p. 9) ◆**Market data/ risk factor** simulation (p. 13) ◆**Bootstrap & calibrate market data** (p. 15) ◆**Transaction valuation and aging** (batch or real-time) – credit risk (p. 17) ◆**Transactions/positions data transformation** (p. 19) ◆**CCISization** (p. 21) ◆**Adjustment overrides/ deal structures** (p. 23) ◆**Netting treatment** (p. 25) ◆**Collateral treatment** (incl. closeout) (p. 27) ◆**Client (party) reference information** (p. 29) ◆**Adjudication** and **documentation** (p. 31) ◆**Reference data CIBC hierarchies** (p. 33) ◆**Calculate accounting measures** (p. 35) ◆**Aggregation and derived risk measures** (p. 37) ◆**Reporting and OLAP** (p. 39) ◆**Limit excess workflow** (p. 41) ◆**Report limit breaches** (p. 43) ◆**Pledging/ projection forecasts** (collateral) (p. 45) ◆**Sensitivity analysis and stress testing** (p. 47) ◆**Month-end** (p. 49) ◆**What-If/ Pre-deal check real-time** (p. 51) ◆**Credit Value Adjustment CVA** (p. 53) ◆**Power analyst & parameter testing** (p. 57) ◆**Economic and regulatory capital calculation** (p. 59)

Credit Risk Exposure

SUNGARD ADAPTIV	
❶Register price factors required by valuation models (FX rate, Interest rate, FX volatility surface) ❷Price factor models register risk factors used to evolve price factors. Construct correlation matrix of risk factors and calculate decomposition (Cholesky or Eigenvalue) ⇨ **Correlations** ❸Generate grid of of dates based on the *Base time grid* that has been defined in the calculation definition. With *Dynamic Dates on*, all other significant dates that are required as per deal properties are also included ❹Generate grid of dates based on *Scenario Time* grid (defined in calculation definition) **REPEAT ❺ through ❽** ❺For each scenario, for each given point on the scenario grid dates and for each registered factor, generate uniformly distributed random numbers through the Box-Muller transformation (using methods available from .net library random class) ⇨ **Random Numbers**	❻For each scenario date, using decomposition matrix, arrive at projected vector of normalized correlated random numbers ⇨ **Risk Factor Values – Scenario Grid dates** ❼For each factor type, generate path value based on the underlying risk factor process of the factor model (Log diff, O U, Poisson) ⇨ **Risk Factor Paths – Scenario Grid dates** ❽Path values for scenarios' risk factor types ready? pricing function triggered at base grid dates and dynamic dates (PV's). Calculation of price factor values at base grid dates (& dynamic dates) happen as per factor model. Path values will form an input in this calculation. If the time points of base grid date do not coincide with the time points of the scenario grid, interpolated path values are taken ⇨ **Price Factors – Base Grid dates and dynamic dates** ⇨ **PV's – Base Grid dates and dynamic dates**

Credit Risk Terminology

◆**BLACK-SCHOLES** ◆**Collateral** ◆**Credit VaR (CVaR)** ◆**Credit Risk Adjudication** ◆**Credit Valuation Adjustment (CVA)** ◆**Duration** ◆**DV01** ◆**Economic capital** ◆**Interest Rate Risk** ◆**Monte Carlo** ◆**Potential Future Exposure PFE**

Credit Valuation Adjustment (CVA)

Factors influencing CVA
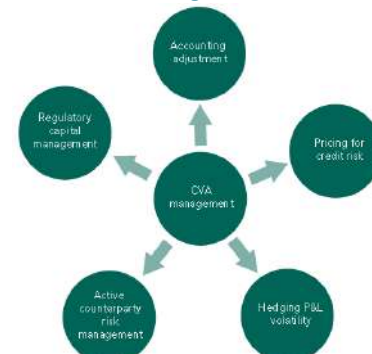
◆**Definition** CVA = Expected (average) credit loss from c/p transactions = Expected exposure (mean of distribution of evolution of mark to markets) × Counterparty default probability × "loss given default"
◆**Accounting adjustment** ⇨ fair value, marked to market, accounting for potential counterparty default ◆**Credit pricing** ⇨ credit risk fairly priced/ compensated ⇨ measured with *Risk Adjusted Return on Capital (RAROC):* originators meet RAROC hurdle then remain "owners" of credit risk

⇨ Evolution of credit pricing: internal transfer pricing to transfer credit risk into a central function and the originating desks pay "insurance" to divest themselves of this risk ⇨ complex measurement methodologies, infrastructure, politics ⇨ CVA function with own P&L, collects premiums from originating desks in return for indemnification ⇨ front office focus on risks affecting P&L ◆**Hedging P&L volatility** ⇨ active CVA management into trading positions ⇨ CVA charge for volatile market spreads (Citigroup's 2009 Q4 included $1.9 billion correction to CVA versus earnings of $3.5 billion) ◆**Active counterparty risk management** ⇨ hedge counterparty risk to reduce P&L volatility and permit business with

specific names ◆Management of regulatory capital ⇨ reduce regulatory capital if c/p exposure hedged (Basel IIII double default formula)

CVA modeling issues

◆**Expected Positive Exposure (EPE)** vs *Potential Future Exposure (PFE)*, used for limit control purposes and measured to higher confidence level (95%, 97.5% or 99%); CVA for accounting adjustment ⇨ "mark to market plus add-on"; CVA actively traded ⇨ Monte Carlo methodology; Use real world (historical) simulation for PFE but risk neutral (market implied) $\frac{\partial^2 V}{\partial S_1 \, \partial S_2}$ for CVA ⇨ different models between PFE and CVA or calibrated differently ◆**Default scenarios** (simple) multiply EPE by static Probability of Default (PD) and Loss Given Default (LGD) (complex) correlate PD with market risk factors for simulation ◆**CVA sensitivities** IR , FX, Credit deltas, gammas and cross-gammas (2nd derivative; for option on S_1 and S_2, cross gamma) ◆**Wrong way risk** (risk for transaction exposure and counterparty default be positively correlated); counterparty risk increases if positive correlation (at time of default, MTM of counterparty's portfolio >> average value); wrong way risk difficult to model because requires correlations between default probability and transaction MTM ◆**Unilateral or bilateral basis** *unilateral CVA* accounts for bank's exposure to its counterparties; *bilateral calculation* includes counterparty's exposure on the bank

CVA Data requirements

◆**Market data** •Name-specific credit spread curves – Spot Spread and 90-Day Average Spread •Average credit spread curves by rating – Spot Spread and 90-Day Average Spread ◆**Reference Data** •LGD by facility External (S&P) • Rating mapped to internal rating (with mapping rules) ◆**Input Data Processing** •Credit spread curves from market data +LGD ⇨ bootstrap PD (probability of default) using risk-neutral measures to calculate CVA. Use average spread curve if name-specific curve is missing for 1 counterparty ◆**Overrides** •PD overrides •LGD overrides •Name-specific credit spread curves overrides, e.g., +50bps for all or selected tenors •Average spread curves overrides, e.g., +50bps for all or selected tenors •Rating mapping overrides, e.g., re-map one name specific spread curve (Rogers A) to another average spread curve (Averaging BBB)

CVA Calculation Process

CVA dependent process

❶Pre-deal Check ❷What-if Analysis ❸Intra-day Incremental (real time feeds) ❹EOD Batch process ❺Month-end process ❻Stress Testing process (Daily, Weekly, Monthly)
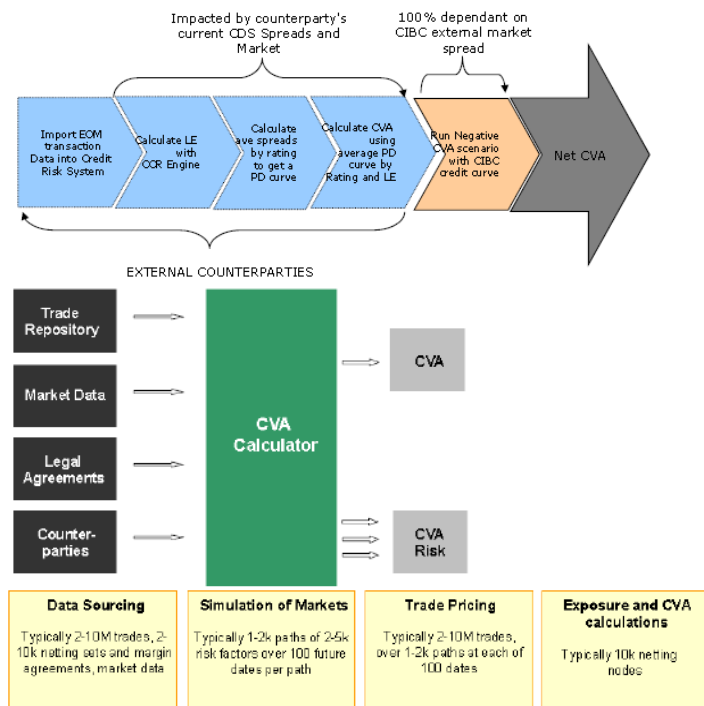
Bi-lateral CVA and Net CVA-dependent process

•Intra-day Incremental for real time feeds •End-of-Day Batch process •Month-end process •Stress Testing process (Daily/Weekly/Monthly)

Negative/positive CVA

•If Bank A faces more credit risk than Counterparty B, CVA is **negative** (i.e. it reduces the value of the OTC derivatives from the perspective of Bank A) •If Bank A faces less credit risk than Counterparty B, CVA is **positive** (i.e. it increases the value of the derivatives from the perspective of A) •If present values of the credit risks are same, CVA = **zero**

CVA versus IRC

•**CVA** is for OTC credit risk measurement •**IRC** for capital charge calculation •**CVA** accounts for change in net exposure of A to B = $E_A S_A - E_B S_B$, where E_A=net exposure of B to A, S_A=mean loss rate of A (EL*PD)= credit risk of A or B potential loss if A defaults. CVA>0, A may risk losing •**IRC** incremental capital charge because VaR does not account for credit events (default and migration)

CIBC Risk systems

Voyager (Market Risk)

Products and risk measures

– Interest rate Products
  • Interest rate delta — IRDlt
  • Interest rate gamma — IRGma
  • Interest rate vega — IRVega
  • Interest rate theta — IRTheta

– Equity
  • Equity DeltaShare — EqDltShr
  • Equity Gamma — EqGmaShr
  • Equity Vega — EqVgDtl
  • Equity Theta — EqThMktPrc

– Commodity

Commodity	Base Metal	CrudeOil	NatGas	SoftCommodity
Commodity Delta	BmDlt	CrdOilDlt	NgDlt	ComIdDlt
Commodity Gamma	BmGma	CrdOilGma	NgGma	ComIdGma
Commodity Vega	BmVg	CrdOilVg	NgVg	ComIdVg
Commodity Theta	BmTheta	CrdOilTheta	NgTheta	ComIdTheta
Commodity Basis risk	BmBasGrk	CrdOilBasGrk	NgBasGrk	

– Credit
  • Credit Delta — CrdSprDlt

35 Source Systems/ 300+ source files feed ❶Store mapped position & GREEK data ❷Store historical data <=13 months ❸Interface with *Enterprises Manual Adjustment* for positional and GREEK data adjustment ❹Provide input for *Euclid* engines to calculate delta & gamma ❺Provide input for DSR engine, SPL back testing & final storage ❻Perform zero GREEK transformation ❼2-way interface with TRMT Internal "TRACS" system ❽Consolidated maestro schedule batch job stream with Voyager DW ❾Historical Simulation Process ❿Products & Risk Measures

TRACS (Credit Risk)

❶**Multi-dimensional analytics** system with capability to analyze syndication strategy by evaluating complex structured transactions, counterparty risk, industry group and client structure, limits and exposure ❷**TRACS Feed System** .NET Windows service responsible for processing (**80+**) incoming feeds & ensuring correct mapping into main TRACS database ❸**Auxiliary Deal Module (ADM)** deal entry & manual adjustment tool (*Transaction Override Module*, *Deal Level MTM and Security Price Override Module*, *Deal Structures Module*, *Manual Deal Entry Module*) ❹**Availability Inquiry Module (AIM)** to evaluate whether to approve or deny potential deals ①**Deal approval / denial** based on current risk exposure levels, daily settlement limits, counterparty term limits ②**Availability Profile reports** for counterparties & deal types ③**Daily Settlement Limit exposure** profile reports ④**Counterparty Exposure Summary** reports ⑤**Counterparty Deal Detail** reports ⑥**Exposure Graphing for counterparty**) ❺**Credit Report Automation (CRA) Credit Stress Engine (CSE)** Calculate *stressed LE & MTM of OTC Derivatives, Repo-style, and Credit Derivatives profiles based on PD, LGD, perturbed parameters* ❻**Credit Simulation Module (CSM)** measures sensitivity of counterparty derivative portfolios to small market movements & large market shocks ❼**Exposure Simulation Module (ESM)** determines potential worst-case loss on counterparty's portfolio ◆**ESM Batch application** runs market simulations daily ◆'**What if**' scenarios executed anytime ◆**Calculated values** •Average MTM •Loan Equivalent (or Average Positive MTM) •Credit Equivalent (or 97.5% MTM) ❽**GL Reconciliation Analytical Tool** delta analysis of risk measures across time series & aggregations through drill down of input parameters and deal data ❾**KMV** computes credit risk of economic capital for large corporate loans & expected loan losses (using Moody's KMV EDF credit measure & Global Correlation Model) ❿**Master Customer Module (MCM)** .NET application to modify counterparty characteristics (e.g., exposure limits, contact information) ❶**Monthly Parameters Update** to update historical data at month start ❷**MTM Difference** interface to examine differences in mark-to-market

Systems and Components

System	Component	Description
Voyager (24) ❶	Limit Management and Maintenance	Set limits for risk measures (risk and sensitivities) stored in Voyager - on every business entity/risk measure combination and stores limit changes history
❷	HMT - Hierarchy Maintenance	Create and change hierarchies of business entities and stores hierarchy change history
❸	Manual adjustments to inputs	Create adjustments for position attributes and sensitivities and store adjustment history
❹	Sensitivities (Greeks) Calculation (Euclid)	Calculate greeks from position data and market data (supplied by GA2)
❺	HistSim	Calculate HistSim and DGVT VaR from sensitivities (greeks) inputs for all hierarchies and business entities. The calculation is for different types of risk, generally delta, gamma, vega and overall risk for Equities, Commodities, IR, FX instruments.
	DGVT VaR	
	Market VaR	
❻	Static PL - Market SPL calculation back testing	Calculation of total and decomposed market PL (greek based)
❼	Odyssey - Market Stress PL Calculation	Calculation of greek based stress PL
❽	Odyssey Web - Market Stress Scenario maintenance	Create and maintain (update, delete) market stress scenarios by defining shocks to risk factors.

Left table:

#	Item	Description
⑨	Stress VaR for Debt Specific Risk	Calculation of DS VaR with stressed input parameters
⑩	VaRTool - Desktop calculation	Calculation of DGVT and HistSim VaR for real or simulated (user defined) portfolios
		Functionality to use positional inputs and market inputs from different days
		Uses Voyager to get the greek inputs
❶	VaRTool - Desktop DSVaR tool	Calculation of DSR for real or simulated (user defined) portfolios
		Use positional inputs and market parameters from different days
❷	**RAROC** calculator	Economic capital calculation in Voyager. Used from Chief Accountant's Division
		Storage of RAROC historically
❸	Regulatory Capital calculator	Calculation of regulatory capital associated with General Market and Issuer-Specific Risk
❹	**BCAR (Basel Capital Adequacy Return)**	Risk Weighted Asset Data for monthly CAD reporting
❺	Stats	Engine calculated statistic parameters for the different market risk factors by processing their return time series
❻	Enterprise DB Staging and Enterprise DB	Data Store with Raw data and results.
❼	MTS Gateway	Delivery mechanism to deliver data from multiple data sources across different system environment.
❽	OMR Adjustment Tool	End user adjustment tool to adjust OMR Securities Month End positions for RWA – **OMR** (Interest Rate - Asset Backed Security, Collateralized Mortgage Obligations, Mortgage Backed Security, Interest Rate Swap, Loan & Deposits)
❾	Enterprise Easy Update Tool	Web end user interfaces to perform ad-hoc updates
❿	Voyager Easy Update Tool	Web end user interfaces to perform ad-hoc updates
❶	Gemini	Aggregate actual P&L data from DFE. Provides adjustment capabilities and calculates various statistical measures which are then loaded into Voyager
❷	**MBVaR**	Merchant Banking VaR
❸	**LTVaR**	Long Term VaR
❹	Re-Insurance	Atlas
TRACS (13) ❶	MTM and Other TRACS User Interfaces	AIM, MCM, ADM, ESM Console, PEF, FX Web link/dealing, CSE Web App, CSM Web App, MTM Differences, Table Maintenance Tool (TMT)
❷	TRACS reporting	Reporting environment - databases (daily, weekly, monthly), OLAP cubes and web plus all OLAP cubes (including TAT), web applications and automations (**Credit Report Automation CRA**) – includes report usage logs
❸	PARAM Process	Monthly parameter calibration databases and all monthly parameter calibration processes
❹	**Exposure Simulation Module ESM** Engine + ESM Batch Processes	
❺	**Credit Stress Engine CSE** and all CSE Batch Processes	
❻	**Credit Simulation Module CSM** Engine, CSM Databases and all CSM Batch Processes	
❼	Month End Processing and Databases	Month End databases and all month end batch processes for month end regulatory - reporting and economic capital reporting including CVA calculations -
❽	PEF - Monthly PEF databases and all monthly PEF processes	
❾	**Table Maintenance Tool TMT** - Functionality/tables that must be maintained	
❿	MCM Document Scanning and Retrieval	
❶	TOES functionality	
❷	Collateral and Pledging Functionality	
❸	Regulatory Capital Calculation for all trade types	
DVP	DVP	
LRS	LRS	
MHS	**Market History Store** Proprietary data warehouse, previously vendor-based and is now developed and owned in-house by **Corporate, Treasury, & Risk Management Technology (CTRM Technology)**	For input to **Value at Risk (VaR)** engines, receives @ close of business, market, related data via shared **File Central;** capture directly from internal databases + external data vendor FTP sites. **Feed schedules** managed via **SQL Agent**. "Value-added" process data quality assessment, data correction, calculation of derived values MHS supplies accurate, current data to a variety of clients, including internal clients, bank computer systems, and business units. **Trading Room Risk Measurement, Monitoring and Control (TRMC)** - primary users and reviewers of data and access MHS via a customized Excel interface. Spreadsheets programmed in Visual Basic and use ODBC to read and write to the MHS databases. **Business Solution Monitoring Control (BSMC)** secondary users access copy of data, downloaded nightly from the MHS database. BSMC (Ranger) users access MHS via an Excel plug-in.
CIBC Mellon	CIBC MELLON	

Right table:

CIBC 5 Asset Classes by 29 Systems

5 asset classes = Commodity, Credit Spread, Equity, Foreign Exchange, Interest Rate

System	Asset Class	Instrument
WSS	Foreign Exchange	FX Contract
	Interest Rate	Money Market
XTRADER	Commodity	Commodity Option
	Equity	American Equity Option, Equities, Equity Swap, European Equity Option, Exotic, Listed Equity Future
		American Equity Option, European Equity Option, Exotic
		Equities, Equity Basket, Equity Forward, Equity Option, Equity Swap, Fixed Income Buyback, Foreign Exchange Future, Listed Equity Future
		Equity Cliquet Option - Equity Option - Exotic
	Foreign Exchange	Commodity Future, Commodity Option, Equities, Equity Basket, Equity Forward, Equity Option, Equity Swap, Fixed Income Buyback, Foreign Exchange Forward, Foreign Exchange Future, Foreign Exchange Option, FX Barrier Option, FX Digital Option, Interest Rate
		Commodity Option, Equity Basket, Equity Option, Fixed Income Buyback, Foreign Exchange Option, FX Barrier Option, FX Digital Option, Interest Rate Option, Interest Rate Swap, Listed Equity Future
		Foreign Exchange Option
	Interest Rate	Commodity Future, Commodity Option, Equities, Equity Basket, Equity Forward, Equity Option, Equity Swap, Fixed Income Buyback, Foreign Exchange Forward, Foreign Exchange Option, FX Barrier Option, FX Digital Option, Interest Rate Future - Generic, Interest
		Fixed Income Buyback, Interest Rate Option, Interest Rate Swap, Single Currency Swaption
		Interest Rate Option
	Commodities	Agriculture - Base Metal - Crude oil - Commodity Index – FX - Interest Rate – Livestock - Natural Gas - Precious Metals - Soft Commodities
OPTEX	Credit Spread	Debenture
	Interest Rate	Annuity, Asset Backed Security, Bankers Acceptance, Bond, Bond Future, Bond Repo/Reverse Repo, Caps, Deposit, Euro Bond Repo, Floating Rate Notes, Foreign Exchange Forward, Foreign Exchange Swap, Forward Rate Agreements, Futures, Interest Rate, Interest Rate Swap
		Option on Interest Rate Swap, Single Currency Swaption
DSTS	Interest Rate	Asset Backed Security, Bankers Acceptance, Bond, Bond Residual, Coupon, Discount Note, Floating Rate Notes, GICs, Mortgage Backed Security, Notes, Treasury Bill
ADP	Equity	Equities
	Interest Rate	Equities
ACBS	Interest Rate	Loan
OPICS Barbados	Interest Rate	Bond, Certificate of Deposit, Commercial Paper, Foreign Exchange Forward, Loan & Deposits, Treasury Bill
	Foreign Exchange	Bond, Certificate of Deposit, Commercial Paper, Foreign Exchange Forward, Loan & Deposits, Treasury Bill
ROLFE & NOLAN	Interest Rate	Bond Future, Interest Rate Future
DVP	Interest Rate	GICs, Loan & Deposits, Loan, Mortgage Backed Security, VarMtg
LOANET	Interest Rate	Loan Borrow/Lend
OMR	Interest Rate	Asset Backed Security, Collateralized Mortgage Obligations, Mortgage Backed Security, Interest Rate Swap, Loan & Deposits
GLOBAL ONE	Interest Rate	Loan Borrow/Lend
OPICs Repo	Interest Rate	Bond Repo/Reverse Repo
MBS	Credit Spread	Bond, Commercial Paper Interest Bearing, GICs, Mortgage Backed Security
Bloomberg	Interest Rate	Bankers Acceptance, Bond Residual, Floating Rate Notes, Notes, Treasury Bill, Bond Repo/Reverse Repo, Cash, Loan
MIDAS	Interest Rate	Bond, Loan & Deposits, Treasury Bill
CMI	Interest Rate	Fixed Rate Mortgage
Calypso	Interest Rate	Credit Swap
Quantifi	Interest Rate	Synthetic CDO
Impact	Interest Rate	Bond – Note – T-Bill Repo/Reverse Repo
COBSCO	Interest Rate	Loan & Deposits
Casea	Equity	CFD, Equities, Foreign Exchange, Futures, Listed Equity Option, Mutual Funds, Preferred Shares, Restricted Stock - RSTK, Equities
MANADJ	Credit Spread	Bond, Notes
FUSION	Credit Spread	Treasury Bill
	Foreign Exchange	Foreign Exchange, Foreign Exchange, Foreign Exchange Forward
	Interest Rate	Foreign Exchange Forward, Foreign Exchange Swap, Loan & Deposits, Treasury Bill
GRD	Credit Spread	Bond, Credit Swap, Floating Rate Notes, Money Market, Preferred Shares
	Equity	CFD, Equities, Foreign Exchange, Futures, Listed Equity Option, Mutual Funds, Preferred Shares, Restricted Stock - RSTK, Equities
	Interest Rate	CFD, Equities, Foreign Exchange, Futures, Listed Equity Option, Mutual Funds, Preferred Shares, Restricted Stock - RSTK, Preferred Shares

GRID	Foreign Exchange	Foreign Exchange Option
	Interest Rate	Unmapped Instrument
IBTSS	Credit Spread	Loan & Deposits
	Interest Rate	Loan & Deposits
MUREX	Credit Spread	Bond, Bond Future, Call account, Certificate of Deposit, Floating Rate Notes, Interest Rate Future, Loan & Deposits, Treasury Bill
	Interest Rate	Bond, Bond Future, Call account, Certificate of Deposit, Floating Rate Notes, Interest Rate Future, Loan & Deposits, Treasury Bill
		Bond, Bond Future, Certificate of Deposit, Floating Rate Notes, Loan & Deposits, Treasury Bill
		Bond, Call account, Certificate of Deposit, Floating Rate Notes, Loan & Deposits, Treasury Bill
FTS	Foreign Exchange	Foreign Exchange, Foreign Exchange, Foreign Exchange Forward
	Interest Rate	Foreign Exchange

SUNGARD

SUNGARD services

❶Late feeds ❷Interrupted file transfer ❸Data integrity (uploaded data) ❹Outage caused by change/ network

SUNGARD Contract terminology

"**Active Deal**" = Single trade record in the Adaptiv Credit Risk database where such record is subject to evaluation or aggregation processing for the purpose of credit exposure calculations as specified in the FRS. Such exposure calculations include but are not limited to: potential future exposure (PFE), settlement risk and issuer risk "**Adaptiv Credit Risk**" or "**ACR**" = Standard Software module (including any updates thereto) of the ASP Services providing global credit exposure data aggregation and management, credit limit management and related functions "**AdaptivTrack**" = SunGard Incident Management System "**Band**" = tier of Transaction volumes and associated Transaction Fees as set out in Section 3.5 to Part F of this Schedule 2 "**Billable Dealing Transaction**" = deal entry, deal modify or deal reversal activity recorded in ACR where such activity triggers a portfolio exposure update as part of the Transaction. For the avoidance of doubt, pre-deal checks, mark-to-market updates or any other end user activity are generally not considered Billable Dealing Transactions "**Downtime**" = time period in which the ASP Services were unavailable to process Transactions, as further defined in Section 5 of Part B of this Schedule 2 "**End of Day**" or "**End Of Period**" = overnight batch process sequence as further described in the documents referenced in Section 2.1 of Part A of this Schedule 2; "**Initial Term**" = time period commencing on the Schedule 2 Effective Date and ending on the earlier of: (a) the fifth anniversary date from the date of Adaptiv Credit Risk First Productive Use, plus the number of days between the date of Adaptiv Credit Risk First Productive Use and December 31st in the calendar year into which the date of Adaptiv Credit Risk First Productive Use falls; (b) the date this Schedule 2 is terminated by either

Party in accordance with the terms of this Schedule 2 and the Agreement **Renewal Term**" = each successive three (3) year period after the Initial Term for which this Schedule is renewed in accordance with clause 2.2 of the Agreement "**Risk Carrier**" = special type of Active Deal that stores the exposure profile for a portfolio, representing a system generated container within Adaptiv Credit Risk for an externally generated exposure profile "**Risk Carrier Transaction**" = special type of dealing Transaction impacting a Risk Carrier deal in the ACR database that stores the exposure profiles for a portfolio of other deal contracts, such Transactions being of the add, modify or reverse types "**Standard Software**" = any Release of: Adaptiv Credit Risk Server; including inter alia Web UI (the "Portal"); Core processing server; Real-time interface handler; and Batch interface handler "**UK Business Hours**" = time period between 09:00 a.m. and 17:00 p.m. (UK local time) on any day from Monday to Friday, excluding official UK bank holidays.

SUNGARD Modules

| Adaptiv Component	Functional Description	Risk Type
Master Data Store (MDS)	Central repository for all trades, issue and static data. The trades types represented in the MDS correspond with products in the various client Front Office systems. Each modification to the data set is validated and audited.	Market Credit
Risk Hub	This is the main application component, hosting the portfolio membership rules, aggregation logic and mapping of the MDS trade format to AA trade format. The following functions are available: Data Admin Tool: • Input and maintenance of static data • Customer mapping • Input of deal corrections and exposure overrides • Viewing and acting on exceptions and warnings Limits and Workflow: • Setting of term-based exposure limits • Setting of maturity checks • Setting of authorised products • Processing of Excesses and Violations Exposure Monitoring: • Viewing of exposures by portfolio • Pre-deal checks • What-If analysis Canned Reports: • Paper-based reporting	Market Credit
RiskScape	Historical exposure database: - Max deal measure values per business day - 15-point portfolio profiles per business day (Note: Full granularity of profile is available in binary format for interrogation where required. This will be built into specified reports (see for example Credit As-Of in Ref #3), and can be inspected ad-hoc via a SunGard tool	Credit

Adaptiv Component	Functional Description	Risk Type
StressScape	Database of exposures from automated Credit Risk stress runs: - Max deal measure values per stress test ID - 15-point portfolio profiles per stress test ID (NOTE: Full granularity of profile is available in binary format for interrogation where required. This will be built into specified reports (see for example Credit As-Of in Ref #3) , and can be inspected ad-hoc via a SunGard tool	Credit
MDS Interface Layer	This handles all interactions between MDS and CIBC upstream and downstream systems. Functions are: - Validation of files received - Conversion of files to "delta" operations - Collection and processing of exceptions	Market Credit
Adaptiv Analytics (AA)	◆**Monte-Carlo (MC) valuation** of applicable trades for market and credit risk based on data with each request. There will be two model sets: - SunGard AA models value trades in FO systems other than X-Trader - RAF models (built by CIBC) value trades booked in X-Trader ◆AA performs for Credit Risk **aggregations** of applicable trades to be passed back to ARH for further aggregation with Factor-based trades. ◆**Incremental Monte-Carlo (IMC)** used for real-time exposures MR + CR ◆**Analytics for market risk** produces scenario results for: - VaR - P&L stress tests - Scenario PV values for Historical Simulation by factor group - Scenario PV values for MC market VaR by factor group - No-action P&L - IRC - (DSR) IR and EQ specific risk scenario PV values ◆Trade associations to **Risk Factors Analytics Workspace** providing users with ability to what-if or replay analyses.	Market Credit
Market Data Manager (MDM)	This is the central repository for all market data, including data for pricing parameters, current market rates, and historical time series. Functions are: - Volatility correlation statistic sets and MC drivers - Current rates and pricing parameters - Calibration of the data based on the models MDM will be fed data from upstream; read-only access for users.	Market Credit
Valuation Input Store (VIS)	This component stores the history of AA formatted trade data, market/historical data, and calculation parameters passed to AA that were used to calculate the scenario PVs. It acts as the principal source for audit, corrections and reproducibility of scenario PVs collected by the RiskCube. The VIS provides the ability to retrieve the trade/market data for any as-of date, and supports corrections to this data. The VIS supports workflow events that control the process for EoD, trade corrections, market data corrections, and late feed processing.	Market
Adaptiv Risk Cube (ARC)	This component allows the viewing, calculation and storage of market risk results dynamically aggregated to users' requested dimension and drilldown to the trade level. ARC receives scenario PV data from AA calculations, and provides drill down slice & dice analysis functionality based on a set of attributes tagged against each trade. These trade tags define the dimensions of the drill down filters.	Market
SWORD	Monitoring of: - KRIs - Adaptiv workflows	Operational Risk

MUREX

Murex FX Deals

Spot Trade settlement/delivery takes place within 1 to 2 business days **Outright/Forward** settlement/delivery takes place on any date other than spot **Swap (+Overnight)** consisting of two parts (Near Leg + Far Leg) **Take Ups (Time Options)** Forward valued trade where the counterparty has the right to trigger delivery of funds between specified date & value date **OIS Overnight Index Swap** overnight rate exchanged for some fixed interest rate **IRS Interest Rate Swap** one party exchanging a stream of interest for another's party's stream **DEPO Deposit** counterparty agrees to take on funds at a specified rate **LOAN** counterparty aggress to sell funds at a specified rate **Futures Trade** allows trader to buy or sell specified amount of given currency at specified price on specific date in future


Asset-class specialisation

Uncompromising specialisation in each asset class
MX.3 delivers leading functionality in each asset class. Native coverage includes several hundreds of product types on all asset classes.

Equities:	Cash and basket trading, index and equity futures and options, exotic options, all kinds of convertibles and warrants, equity swaps and CFDs, equity-linked notes and structured deals.
Interest rates:	money markets, treasury bonds and repos, interest rate derivatives including exotics, emerging markets and structured deals.
Foreign Exchange:	Spot and forward, vanilla and exotic options.
Credit:	Bonds, convertibles, loans, vanilla credit derivatives (CDS; credit options, baskets, etc.) and structured credit (e.g. structured CDOs).
Macroeconomic derivatives:	Mainly inflation bonds, swaps and options
Energy & Commodities:	Electricity, crude oil and refined products, coal, natural gas, emissions, base metals, pulp, precious metals, soft commodities / agris, freight derivatives (dry & wet). Both physical and financial trades are supported.
Hybrids:	transactions combining any asset class.
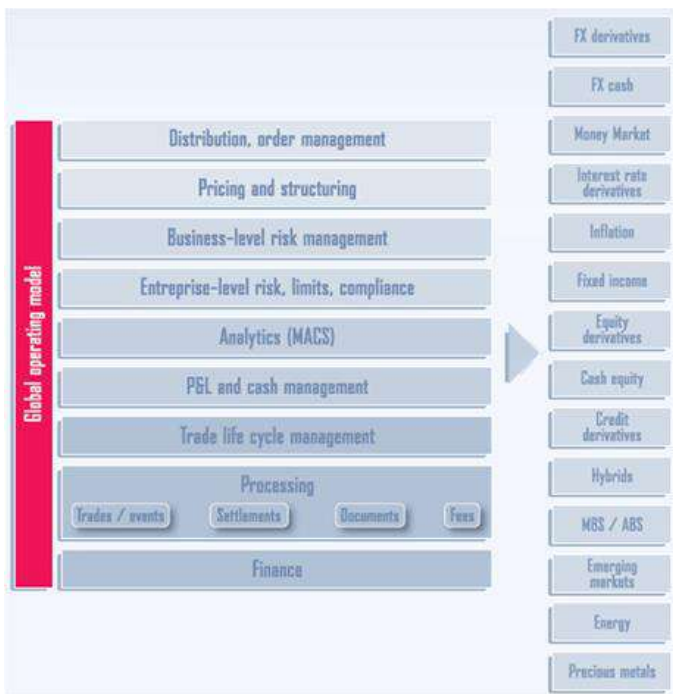
FX portfolios

All Spot portfolios will be owned and maintained within their own region. As well, all non-CAD forwards trades will be maintained in their respective portfolios. All CAD forwards will be routed to the Toronto Forward book 'Darrin Brooker' from all regions. The FX system will strip out all forward CAD positions of booked trades to portfolio 'Darrin Brooker', regardless of the geographical origin of that trade. Any non-CAD forward positions will remain in the respective trading center. All portfolios will have the capability to input trades in all MurexFX supported products and view their risk on a portfolio basis.

MUREX trade flow
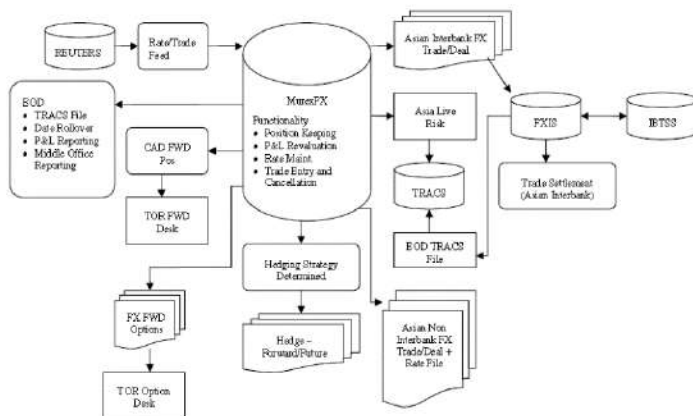
Trading system interfaces

Electronic Broking Systems EBS's closest competitor is **Reuters Dealing 3000 Spot Matching**. The decision by an FX trader whether to use EBS or Thomson Reuters Matching is driven largely by currency pair. In practice, EBS is the primary trading venue for EUR/USD, USD/JPY, EUR/JPY, USD/CHF and EUR/CHF, and Thomson Reuters Matching is the primary trading venue for commonwealth (AUD/USD, NZD/USD, USD/CAD) and emerging market currency pairs.

P&L Calculation

Deal's 4 components ❶Exchange Rate ❷Base Rate ❸Spread & Discounts ❹Amounts Consider EUR/JPY trade for $1M buying EUR, exchange= 161.5257 (-0.015 discount), base rate= 1.358677 EUR/USD (0.000056 discount), spread of 0.002 (on the EUR rate) **JPY amounts** = $1M * 161.527 (Exch. Rate) = 161,527,000.00; **USD/JPY forward rate** = 118.8855504 (Exch. Rate / Base Rate) + **spot rate** = 118.87050406 (Exch. Rate + Exch. Discount); **EUR/USD forward rate** = 1.360677 (Base Rate + Spread) + **spot rate** = 1.360621 (Base Rate + Spread – Base Discount) ⇨ spread P&L generated on this trade 2000 EUR (EUR/USD Forward Rate * 1M – (Base Rate * 1M)) ⇨ 1472.02 USD IN P&L
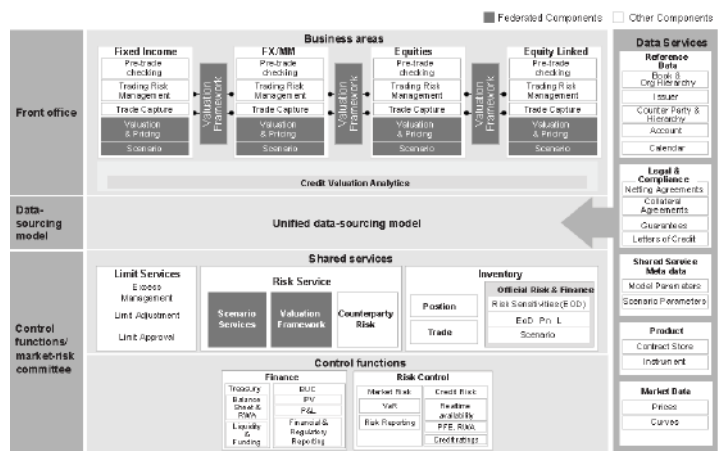
<u>**Federated Architecture (FA)**</u> = pattern in enterprise architecture that allows interoperability and information sharing between semi-autonomous de-centrally organized lines of business (LOBs), information technology systems and applications

On Risk Data architecture
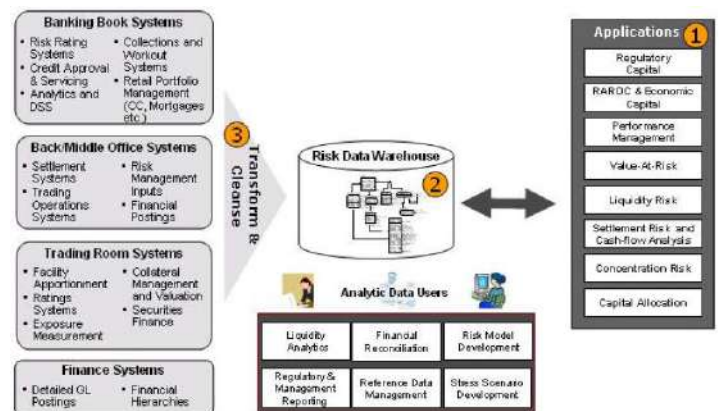
❶**Data Processing applications** extract-and-process ❷**Analytic Repository** simple reporting to complex ad-hoc queries, usually a confusing mish-mash of different systems ❸ **Data Cleansing and Transformation** from flat files, real-time data from data bus, data quality issues, snapshot data vs. changes - large volumes with imperfections in data
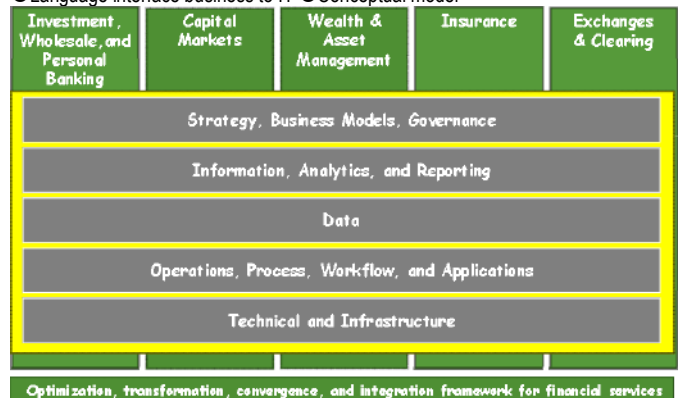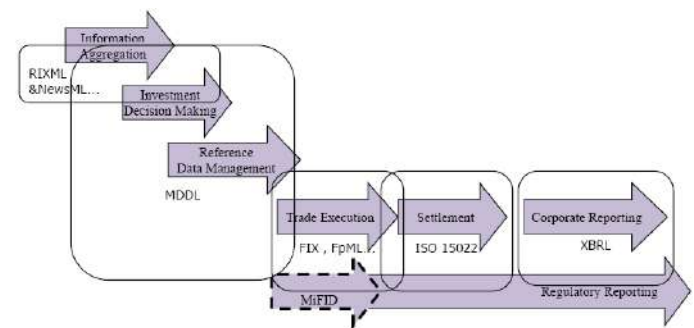
On Financial Risk Data Requirements

❶**Detail** rather than aggregate data but detailed transactional and position data for on-request/ situational ad-hoc aggregates ❷**Complete** 100% coverage of all positions of the firm instead of only notional size of a position ❸**Timely** analysis to keep up with rapidly moving markets ❹**Integrity** correct data
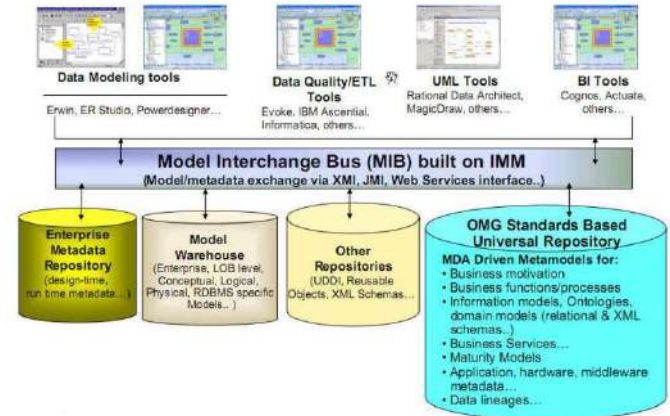
Risk Data Management Best Practices

Bank in essence = IT Company ❶Software manufacturing ❷Data production & consumption ❸Information supply chain **How to manage business view of data**? ❶Language interface business to IT ❷Conceptual model

Governance
Governance, Compliance, Control, and Audit
- Governance framework, policies, rules, guidelines, and compliance process
- Social and community responsibility
- Reviews, control assessments, self-assessments, audit, regulatory, and compliance programs
- Risk and Financial strategy, process and transformation
- Audit and control intelligence, analytics, and reporting
- Program and project management office (PMO)
- Data warehouse, metadata, data model, entitlements and information lifecycle
- Security, safety, and Vendor management, managed services, and outsourcing
- Monitoring and surveillance automation

Performance
Risk and Performance Measurements
- FASB codification and FASB IFRS rule convergence
- Financial intelligence, financial analysis
- Financial and management reporting
- Global aggregations and consolidations
- Planning, budgeting, and forecasting
- GL closings, GL events, GL transactions
- Risk adjusted returns, and transfer pricing
- Cost transparency, activity based costing
- ALCO, ALM pricing / working capital optimization
- Pensions, benefit portfolios HR, AR/AP
- Physical and IT asset management
- Financial crimes, internal external fraud

Sustainability
Capital and Balance Sheet Management
- Regulatory intelligence, analytics, and reporting
- Capital intelligence, analytics, and reporting
- Capital calculation, correlations, and allocation
- ICAAP - SCAP- CCAR programs
- Economic stress and scenarios
- Model validation and performance
- Basel I, II, III, US Final Rule
- Dodd-Frank, SEC, FINRA, Treasury, Federal Reserve
- Regulations (SEC, FIFEC, FED, OCC, BHC)
- Trade practices (Mifid, Reg NMS FINRA, CFTC)
- Unfair and Deceptive Acts or Practices (UDAP)
- Future regulations (OTC derivatives, CFTC, exchanges, clearing, and settlement, guidelines)

Capital Adequacy, Analysis, and Planning (CCARs)
Capital analysis and review
- CCARs, ICAP, SCAP - Perform comprehensive capital analysis and review
- Capture and monitor firm-wide direct and indirect exposures
- Enhance business intelligence and analytics with support by reliable data warehouses and data governance programs
- Implement capital adequacy and planning
- Run scenario and stress testing
- Screen counterparty credit risk

Asset-liability management and liquidity funding
- Monitor short term funding (LCR) and long term (stable) funding (NSFR) liquidity
- Enhance investment planning and asset management
- Examine A/L run-off, funding facilities and bookstep, and liquidity events impacts
- Fully understand pricing, price mismatches, volatility, and the implied one on collateral
- Rationalize leverage, secure alternative funding, and rationalize the use of government liquidity facilities

Measurement, Reporting, Disclosure, and Transparency (RPMs)
Enterprise risk measurement
- Analyze and report enterprise-wide risk and performance measurements (RPMs)
- Produce information risk adjusted returns (RAROC/RORAC)
- Reconcile risk to financials including actual, forecast, and plan measurements
- Validate models and root out data quality weaknesses and model error
- Ensure comprehensive, accurate, and timely risk information

Enterprise performance measurement
- Provide disclosures and transparency to regulators, shareholders, clients, and community
- Confirm and optimize profitability and performance models
- Strengthen and assure consistent profit and contribution margins

Strategy, Capacity, Control, and Efficiency Management (MPGs)
Resource and cost management
- Address business strategies with maturity models and improvement programs
- Implement business transaction monitoring (BTM) and business activity monitoring (BAM)
- Investigate cost takeout, examine alternate source operations and technology components
- Investigate software, platform, and infrastructure as a service both on internal and external clouds
- Employ activity based costing (ABC)
- Optimize IT asset and resource management (ITRM)

Product and process optimization
- Implement high performance measurement platforms and governance (MPGs)
- Address shifts in information programs for legal entity ID (LEI) and product ID (PID)
- Optimize operational processes and workflows and consider transformational modernization programs

... which means optimizing, converging, transforming, and integrating business intelligence, data, processes, applications and technology delivery platforms

---

Data Quality Measures and Indicates
- **Accuracy** - Does the data accurately represent reality or a verifiable source?
- **Integrity** - Do broken links exist between data that should be related?
- **Consistency** - Is there a single representation of data?
- **Completeness** - Is any key information missing?
- **Validity** - Is the data stored in acceptable format and contain valid values?
- **Accessibility** - Is the data easily accessible, understandable, and used consistently?
- **Timeliness** - Is information recorded and made available to systems as rapidly as is required?

Data Governance Subject Areas
- Organizational Awareness
- Stewardship
- Policy
- Value Creation
- Security / Privacy / Compliance
- Risk Lifecycle Management
- Classification & Metadata
- Data Architecture
- Data Quality
- Information Lifecycle Management (ILM)
- Audit & Reporting

... which translates to who, what, when, where, and why is the data made available and how well does the data

---

Why Missing
- No response - no information is provided for several items or no information is provided for a whole unit
- Incomplete - data collection was not done properly or if mistakes were made with the data entry
- Dropouts - values drops out before the test ends and one or more measurements are missing
- Out of bounds - value lies outside an acceptable range
- Truncation - values outside the bounds are entirely omitted
- Rounding - replacing values that are approximately equal but has a shorter, simpler, or more explicit representation

Techniques of dealing with missing data
- Imputation - imputing a small amount of non-robust content data
- Partial imputation - patterns of missing data used to impute outcomes
- Deletion - methods which involve reducing the data available
- Full analysis - takes full account of all information available without the distortion resulting from using imputed values
- Interpolation - method of constructing new data points within the range of a discrete set of known data points
- Censoring statistics - value of a measurement or observation is only partially known
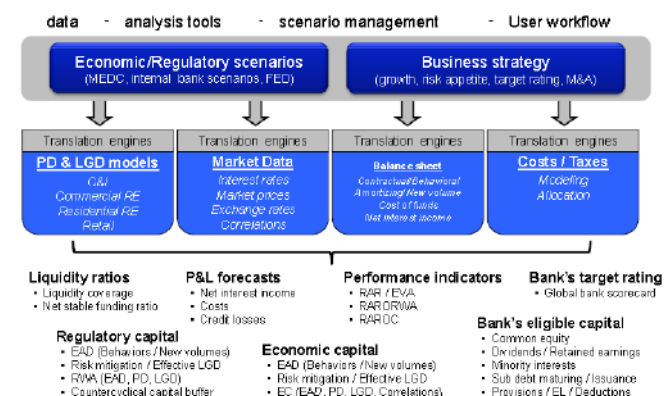- Dummy variables or proxy variables - stand-ins for qualitative facts
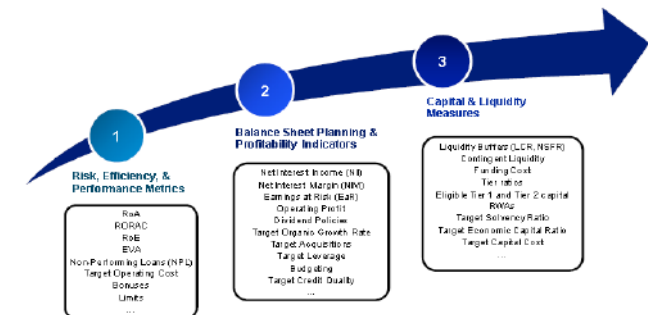

Investment Platform

Data standards in process chain

- An example of standards involved in market trading, but same for all end-to-end "chained" business processes

Model Interchange Bus (MIB) built on IMM
(Model/metadata exchange via XMI, JMI, Web Services interface..)

OMG Standards Based Universal Repository
MDA Driven Metamodels for:
- Business motivation
- Business functions/processes
- Information models, Ontologies, domain models (relational & XML schemas...)
- Business Services...
- Maturity Models
- Application, hardware, middleware metadata...
- Data lineages...

Financial Risk Topics

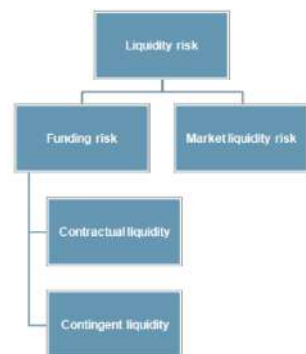## Stress testing framework

Risk appetite

Liquidity Risk

Overview

◆**Contractual liquidity** assessment of all material, known/ expected cash flows from existing contracts under normal/ stressed market conditions ◆**Contingent liquidity** assessment of all expected cash flows taking into account customer behavior (prepayments, rollovers, draw down of credit lines, recoveries) under normal + stressed markets ◆**Market liquidity risk** assessment of market liquidity + credit spreads under normal and stressed market

Cash flow landscape
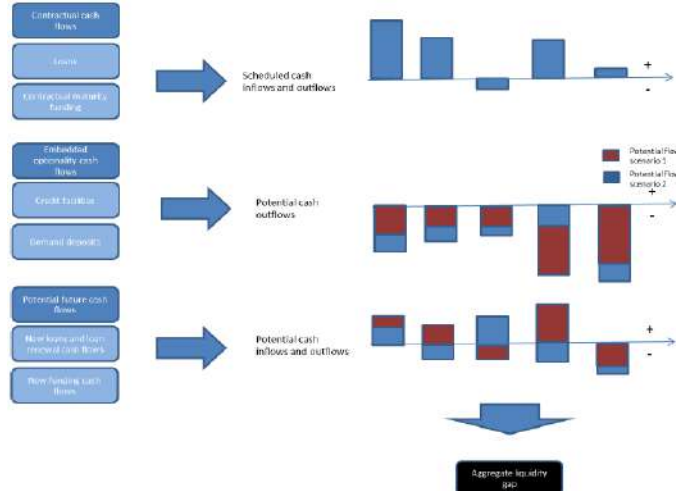
Fund transfer pricing with liquidity risk

Maturity	1 Year	2 Years	3 Years	4 Years	5 Years
Swap rate	3.80%	3.90%	4.20%	4.40%	4.50%
Liquidity spread	0 bps	13 bps	27 bps	35 bps	40 bps
Credit spread	5 bps	19 bps	38 bps	47 bps	59 bps
Other spreads*	3 bps	7 bps	11 bps	17 bps	22 bps
Capital allocation	0.5%	0.5%	0.5%	0.5%	0.5%
Capital cost**	6%	6%	6%	6%	6%

FTP = FTP (swap) * (100% - Capital allocation) + Capital allocation * Capital cost + FTP (spreads)

Contingent liquidity pricing for a facility
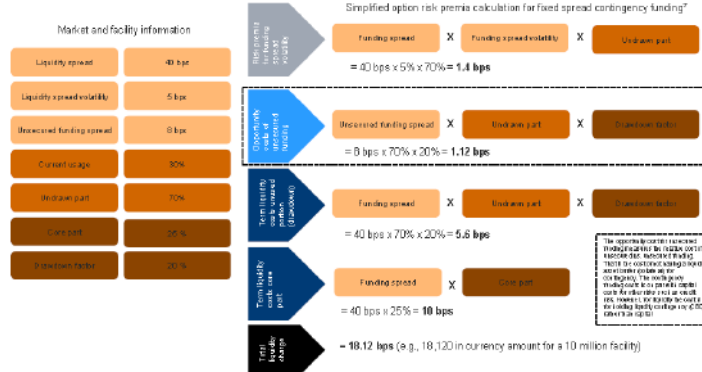
Contingent Cash Flow Funding Risk (CCFR) for derivatives

◆**CCFR**=method to determine the market value of cost of funding of assets and liabilities; applies to all trades and positions including retail assets and liabilities ◆**Liquidity funding risk (LFR)** leverages Market and Credit Risk data feeds; retail feeds leverage off the current Liquidity Risk System (LRS) feeds ◆**CCFR sources** = GIC'S, VISA, bank account, RRSP, wholesale automobile loans, mortgages, student loans, commercial loans

Non-trading risk

WESTPAC Definition

◆**Non-traded market risk (interest rate risk in banking book)**= risk to interest income generated by a mismatch in the duration of the assets and liabilities (Treasury's responsibility) ◆**Equity underwriting & warehousing risk** ◗*Equity underwriting*= development of solutions for corporate and institutional customers with demand for equity capital ◗*Equity warehousing*= acquisition of assets in anticipation of refinance through combination of senior, mezzanine and capital market debt and listed, unlisted and privately placed equity; unlike *underwriting risk*, bank is principal owner from acquisition until sale ◗Managing equity underwriting & warehousing risk ⇨ evidence of expected equity investor/ debt financier interest ◆**Operational risk** from inadequate or failed internal processes, people and systems or from external events ◆**Liquidity risk** potential inability to meet payment obligations (responsibility of Treasury, who monitors funding base & ensures that base prudently maintained & adequately diversified ◆Compliance risk ◆Reputation risk

Non-Trading Book Exposures in Equities (Lloyds bank)

◆Wholesale - from transactions in private equity market as result of *debt for equity swaps*, medium term investments held for gain with limited partnership stakes & listed/ unlisted equity shares ◆**Available-for-Sale financial assets** non-trading debt securities/ equity shares, at fair value through profit/loss, held-to-maturity investments or loans & receivables; recognized in B/S at fair value, inclusive of transaction costs; sold in response to needs for liquidity or changes in interest rates, exchange rates or equity prices; gains/losses recognized in *other comprehensive income*, until the financial asset is either sold, becomes impaired or matures (cumulative gain/loss then recognized in income statement). Interest calculated using effective interest method and FX gains & losses on debt securities denominated in foreign currencies are recognized in income statement; can be transferred to *loans and receivables* or *held-to-maturity* category ◆**Equity Investments (Including Venture Capital)** unlisted equities and fund investments

Basel III

Overview

Financial Institution in Canada

Number of Financial Institutions (2012-06)		Regulated/Unregulated			
FI Sector	FI Sub-Sectors	R	TBD	U	Total
⊟Banks	Cdn Banking	47			47
	Non-CDN Banks	776			776
Banks Total		823			823
⊟Brokers/Dealers	Brokerage		210		210
Brokers/Dealers Total			210		210
⊟Hedge Funds	Hedge Funds			297	297
Hedge Funds Total				297	297
⊟Holding Companies	Holding			370	370
Holding Companies Total				370	370
⊟Insurance	Insurance Brokers	8			8
	Life	131			131
	Other Insurance	15			15
	Property/Casualty	94			94
Insurance Total		248			248
⊟Investment Funds	Closed End Funds	79			79
	Fund Managers	27			27
	Mutual Funds			525	525
	Other Funds	39			39
Investment Funds Total		145		525	670
⊟Other Financial Services	Other Financial Interm	6		230	236
Other Financial Services Total		6		230	236
⊟Pension Funds	Pension Funds		133		133
Pension Funds Total			133		133
Total		1222	343	1422	2987

Capital reform, Liquidity Standards, Systemic Risk

Basel III

Capital reform	Liquidity standards	Systemic risk and interconnectedness
Quality, consistency, and transparency of capital base	Short-term: Liquidity Coverage Ratio (LCR)	Capital incentives for using CCPs for OTC
Capturing of all risks	Long-term: Net Stable Funding Ratio (NSFR)	Higher capital for systemic derivatives
Controlling leverage		Higher capital for inter-financial exposures
Buffers		Contingent capital
		Capital surcharge for systemic banks

Capital under BASEL III

Required Capital	Available Capital	
Op. Risk — Operational Risk	Tier 3 Abolished	Basel 2
Credit Risk / Banking Book — Fixed assets, Derivatives, Secured Finance, Retail Loans, Commercial Loans: Banks	Tier 2 Restrictions	
CVA	Tier 2	Basel 2.5: Trading Book
Market Risk / Trading Book — CRM, Securitizations, Stressed VAR, IRC, VAR	Tier 1 Deductions	
	Tier 1	Basel 3

Minimum Capital Standard

Minimum Capital Requirement	Capital Conservation Buffer	Countercyclical Buffer
• Minimum common equity ratio increases from 2% to 4.5%	• Capital conservation buffer of 2.5% must be met with common equity (after regulatory adjustment)	• A countercyclical buffer (0.0%–2.5%) of common equity or other loss absorbing capital will be introduced

Total Capital 8.0%; Common Equity (after deductions) 4.5%; Hybrid Tier 1; Tier 2; Tier 1 Capital 6%.

Total Capital 10.5%; Common Equity (after deductions) 7.0%; Hybrid Tier 1; Capital Conserv. Buffer 2.5%; Tier 2; Tier 1 Capital 8.5%.

Total Capital 10.5–13.0%; Common Equity (after deductions) 7.0–9.5%; Counter-cyclical Buffer 0.0–2.5%; Capital Conserv. Buffer 2.5%; Tier 2; Hybrid Tier 1; Tier 1 Capital 8.5–11.0%.

Regulatory Objectives

1-Increased quality of capital
2-Increased quantity of capital

Regulatory objective – (1) Increased quality of capital

Basel III contains various measures aimed at improving the quality of capital, with the ultimate aim to improve loss-absorption capacity in both going concern and liquidation scenarios.

Description of the key changes	Implications
• Common equity and retained earnings should be the predominant component of Tier 1 capital instead of debt-like instruments, well above the current 50 percent rule.	• BCBS measures are already discounted by markets, so banks are likely to clean up their balance sheets as soon as possible.
• Harmonized and simplified requirements for Tier 2 capital with explicit target for Tier 2 capital.	• Likely to see raising of significant capital by banks, along with retention of profits and reduced dividends.
• Full deduction for capital components with little loss-absorption capacity such as minority interests, holdings in other financial institutions, Deferred Tax Assets.	• National regulators will have less flexibility to allow capital instruments to be included in Tier 1 or Tier 2 capital.
• Gradual phase-out of hybrid Tier 1 components, including many of the step-up/innovative/SPV-issued Tier 1 instruments used by banks over the past decade.	• Systemically important banks (and, potentially, all banks) may be allowed to issue contingent convertibles to meet additional capital requirements.

Regulatory objective – (2) Increased quantity of capital

Basel III contains various measures aimed at increasing the level of capital held by institutions, as well as providing counter-cyclical mechanisms.

Description of the key changes	Implications
Minimum common equity Tier 1: • Increased from 2.0 percent to 4.5 percent • Plus capital conservation buffer of 2.5 percent • Bringing total common equity requirements to 7.0 percent • To be phased in from 2013 to 2019 Minimum total capital: • Increased from 8.0 percent to 10.5 percent (including conservation buffer) • To be phased in from 2013 to 2019 Counter-cyclical capital buffer is being developed, which is expected to be implemented by increases to the capital conservation buffer during periods of excessive credit growth.	• Banks will face a significant additional capital requirement, and the bulk of this shortfall will need to be raised as common equity or otherwise by retaining dividends. • In principle, banks will be able to draw on the capital conservation buffer during periods of stress, but it seems unlikely that they would choose to do so, given the associated constraints on their earnings distributions. • Consequently, banks are likely to target a higher common equity ratio and the market expectation for common equity Tier 1 appears to be moving to approximately 9 percent. • There is likely to be further add-ons for Pillar 2 risks, systemically important firms, and the counter-cyclical capital buffer, so banks may target a total capital ratio of 13–15 percent.

3-Reduced leverage with backstop leverage ratio

4-Increased short-term liquidity coverage

Regulatory objective – (3) Reduced leverage through introduction of backstop leverage ratio

The leverage ratio acts as a non-risk sensitive backstop measure to reduce the risk of a build-up of excessive leverage in the institution and in the financial system as a whole. The leverage ratio remains controversial, and there remains ambiguity about certain aspects of the exact mechanics.

Description of the key changes	Implications
• The leverage limit is set as 3 percent, i.e. a bank's total assets (including both on- and off-balance-sheet assets) should not be more than 33 times bank capital.	• The introduction of the leverage ratio could lead to reduced lending and is a clear incentive to banks to strengthen their capital position, although it remains to be seen whether the ratio will bite for individual firms.
• In 2011, reporting templates will be developed. In 2013, regulators will start monitoring leverage ratio data, and the ratio will be effective from January 2018.	• The non-risk-adjusted measure could incentivize banks to focus on higher-risk/higher-return lending.
• The ratio is introduced to supplement the risk-based measures of regulatory capital.	• Pressure arises on banks to sell low margin assets (e.g., mortgages), which could drive down prices on these assets.
• The leverage ratio is implemented on a gross and unweighted basis, not taking into account the risks related to the assets.	• Banks may be required by the market and the rating agencies to maintain a higher leverage ratio than required by the regulator.

Regulatory objective – (4) Increased short term liquidity coverage

The regulatory response to the financial crisis has seen a long overdue rebalancing towards the importance of liquidity risk management and to complement its "Principles for Sound Liquidity Risk Management and Supervision," the Basel Committee has further strengthened its liquidity framework by developing two minimum standards for funding liquidity.

Description of the key changes	Implications
• The 30-day Liquidity Coverage Ratio (LCR) is intended to promote short-term resilience to potential liquidity disruptions. The LCR will help ensure that global banks have sufficient high-quality liquid assets to withstand a stressed funding scenario specified by supervisors.	• The Risk of impact from a bankrun should be reduced, which would improve the overall stability of the financial sector.
• For the LCR, the stock of high-quality liquid assets is compared with expected cash outflows over a 30-day stress scenario. The expected cash outflows are to be covered by sufficiently liquid, high-quality assets.	• The introduction of the LCR will require banks to hold significantly more liquid, low-yielding assets to meet the LCR, which will have a negative impact on profitability.
• Assets get a 'liquidity'–based weighting varying from 100 percent for government bonds and cash to weightings of 0 percent–50 percent for corporate bonds.	• Banks will change their funding profile, which will lead to more demand for longer-term funding. This funding may not be available from institutional investors that generally seek to reduce their holdings in the financial sector.
	• Interpretation of 'right' run-off rates by national regulators may cause level-playing field discussions.

5-Increased stable long-term balance sheet funding

6-Strengthen risk capture notably counterparty risk

Regulatory objective – (6) Increased stable long-term balance sheet funding

The Net Stable Funding Ratio (NSFR) is designed to encourage and incentivize banks to use stable sources to fund their activities to reduce the dependency on short-term wholesale funding.

Description of the key changes	Implications
• The NSFR compares available funding sources with funding needs resulting from the assets on the B/S.	• The NSFR incentivizes banks to reduce their reliance on short-term wholesale funding and increase stability of the funding mix.
• Available stable funding > required stable funding.	• Banks will need to increase the proportion of wholesale and corporate deposits with maturities greater than one year, but currently, the appetite for term debt is limited.
• Required and available funding amounts are determined using weighing factors, reflecting the "stability" of the funding available and the duration of the asset.	• For most banks, it will be difficult to increase the proportion of wholesale deposits with maturities greater than one year (limited market demand), which is likely to lead to higher funding costs.
• The weighing factors for assets vary from 0 percent and 5 percent for cash and government bonds, respectively, to 65 percent for mortgages, 85 percent for retail loans, and 100 percent for other assets.	• Managing the NSFR by altering the asset mix will likely result in an increase in the proportion of short-term assets, reducing yield.
• For determining stable funding available for liabilities, the weighing factors vary from 100 percent for Tier 1 capital to 90 percent for core retail deposits and 50 percent for unsecured wholesale funding. ECB funding is weighed at 0 percent.	• Stronger banks with a higher NSFR will be able to influence market pricing of assets. Weaker banks will see their competitiveness reduced, which will potentially decrease the level of competition.

Timeline

Enterprise Risk
ERM framework

• **Strategic Risk Management** enabled by strong governance, identification, assessment, management of risks
• **Key tools** include risk appetite, risk assessments, stress testing, capital management
• **Analysis** uses multiple approaches & lenses (accounting and economic) to assess risk and reward

Risk Appetite, Assessment, Measurement

RISK APPETITE	RISK ASSESSMENT	RISK MEASUREMENT
•**Enterprise + business unit risk tolerance, strategy, policy & financial goals** • **Periodic review, actively engage Board, C-Suite**	• Identify, manage top 10-15 key risks faced by enterprise • Quarterly review • Self Assessments • NPI Process	• Economic Capital • RAROC • Stress Testing • Category specific - Loss Forecasting, VaR etc. • Aggregation • Drilldowns

Sample Process Workflow

Risk Type - Risk Management

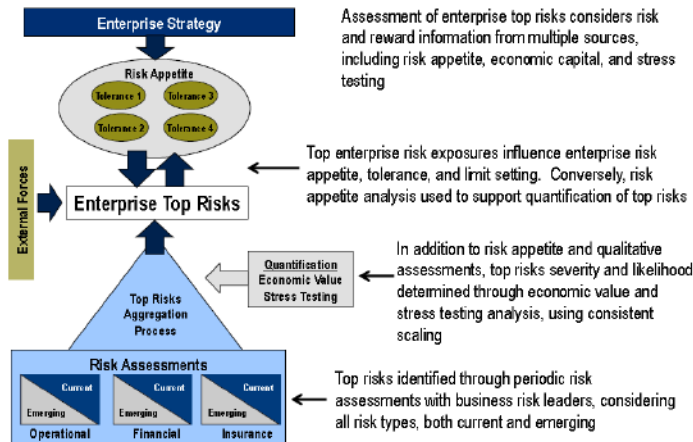|	Top Risks	Stress Testing	Risk Appetite	Economic Value/Capital
Top Risks informs:		X	X	X
Stress Testing informs:	X		X	X
Risk Appetite informs:	X			
Economic Value/Capital informs:	X		X	

Risk Models

A range of risk models is used, each fit for purpose, with reconciliations across platforms to ensure consistency. All models are subject to a single model governance framework
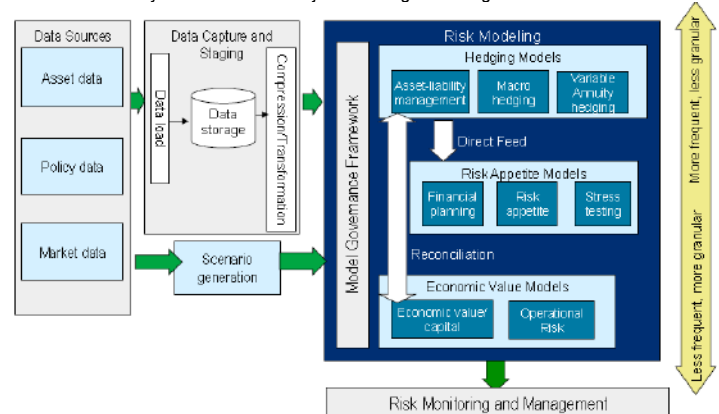
Interest Rate Analysis Example

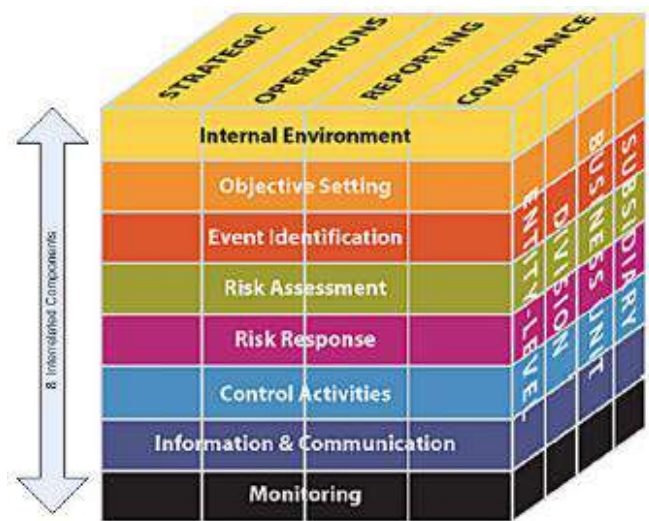| Framework/ Models	Analysis Performed
Product Risk Analysis	Regular review of product spread compression to inform in-force management and new product pricing
Stress Testing	Used a "zero rates" stress test on projection of future risk based capital (RBC) over a 30 year period to assess exposure to extended low rates
Risk Appetite	Quarterly analysis of high and low rate scenarios to assess impact relative to risk limits – corrective actions taken in the event early warning signals are breached
Economic Value Model	Analyzed impact on economic surplus of a 475 basis point rate shock up and down

Identifying Top Risks

Assessment of enterprise top risks considers risk and reward information from multiple sources, including risk appetite, economic capital, and stress testing

Top enterprise risk exposures influence enterprise risk appetite, tolerance, and limit setting. Conversely, risk appetite analysis used to support quantification of top risks

In addition to risk appetite and qualitative assessments, top risks severity and likelihood determined through economic value and stress testing analysis, using consistent scaling

Top risks identified through periodic risk assessments with business risk leaders, considering all risk types, both current and emerging

Financial Regulation

Compliance Issue Types	Examples of Corresponding Regulations
Privacy	• Gramm-Leach-Bliley Act (United States) • Insurance Conduct of Business Rules (Europe) • Anti Money Laundering Directive (United States) • Proceeds of Crime Act (United Kingdom)
AML	• Patriot Act (United States) • Anti Money Laundering Directive (United States) • Proceeds of Crime Act (United Kingdom)
Customer communication	• Insurance Mediation Directive (Europe) • Gramm-Leach-Biley Act (United States)
Financial reporting	• Sarbanes-Oxley Act (United States) • International Financial Reporting Standards incorporating the International Accounting Standards (IFRS/IAS) • Financial Services Authority Prudential Source Book (United Kingdom)
Capital adequacy	• Basel II (International) • IFRS/IAS • Solvency II (European Union)
Operational risk	• Basel II • IFRS/IAS • Solvency II

Operational Risk

COSO

Operational Risk

4 types of losses

PEOPLE
- Internal fraud and/or "errors"
- Intentional computer crime
- Misuse of confidential customer information

SYSTEMS
- Failure of IT systems
  - Hardware
  - Software
- Unintentional operator failures

EXTERNAL EVENTS
- Customer satisfaction
- Competitor activity
- Supplier exposures
- External fraud
- Damage to physical assets

PROCESS
- Employment practices and workplace safety
- Quality of MIS
- Inadequately trained staff
- Ineffective selling
- Data entry errors

BIS Definition

Eight business lines
1. Retail banking
2. Commercial banking
3. Trading and sales
4. Retail brokerage
5. Corporate finance
6. Agency services
7. Payment and settlement
8. Asset management

Seven types of risk
1. Execution, delivery and process management
2. External fraud
3. Clients, products and business practices
4. Internal fraud
5. Damage to physical assets
6. Employment practices and workplace safety
7. Business disruption and system failures

Risk Identification, Type, Cause

Event-Type Category (Level 1)	Definition	Categories (Level 2)	Activity Examples (Level 3)
Internal fraud	Losses due to acts of a type intended to defraud, Misappropriate property or cicrumvent regulations, the law or company policy, Excluding diversity/ discrimination events, which involves at least one internal party.	Unauthorised Activity	Transactions not reported (Intentional) Transaction type unauthorised (W/monetary loss)Mismarking of position (Intentional).
		Theft and Fraud	Fraud/Credit fraud/Worthless deposits theft/Extortion/Embezzlement/robbery Misappropriation of assets Forgery Check kiting, Smuggling, Account take over/Impersonation/etc.. Tax non-compliance/Evasion (wilful) Bribes/Kickbacks, Insider trading (Not on firm's account).
External fraud	Losses due to acts of a type intended to defraud, Misappropriate property or circumvent the law, by a third party	Theft and Fraud	Theft, Robbery, Forgery, Check kiting
		Systems Security	Hacking damage Theft of information (w/monetary loss)
Employment Practices workplace Safety	Losses arising from acts inconsistent with employment, Health or safety laws or agreements from payment of personal injury claims, or from diversity/discrimination events	Employee Relations	Compensation, Benefit, Termination issues, Organised labour activity.
		Safe Environment	General liability (Slip and fall, etc..) Employee health and safety rules events, Workers compensation.
		Diversity and Discrimination	All discrimination types.
Clients, Products and Business Practices	Losses arising from an unintentional or negligent failure to meet a professional obligation to specific clients (including fiduciary and suitability requirements),or from the nature or design of a product.	Suitability, Disclosure and Fiduciary	Fiduciary breaches, Guideline violations, Suitability, Disclosure issues (KYC, etc.) Retail customer disclosure violations Breach of privacy, Aggressive sales, Account churing, Misuse of confidential information, Lender liabilit.
		Improper Business or Market Practices	Antitrust, Improper trade/market practices Market manipulation Insider trading (on firms account) Unlicensed activity Money laundering
		Product flaws	Product defects (unauthorised, etc.) Model errors
		Selection, Sponsorship and Exposure	Failure to investigate client per guidelines Exceeding client exposure limits
		Advisory Activities	Disputes over performance of advisory activities
Damage to Physical Assets	Losses arising from loss or damage to physical assets from natural disasteror other events.	Disasters and other events	Natural disaster losses Human losses from external sources (terrorism, Vandalism).
Business disruption and system failures	Losses from failed transaction or process management, from relations with tade counterparties and vendors.	Systems	Hardware, Software Telecommunications Untility outage/disruptions.
Execution Delivery and process Management	Losses arising from disruptio of business or system failures.	Transaction Capture, Execution and Maintenance.	Miscommunication, Date entry, Maintenance or lodad error, Missed/System misoperation, Accounting error/Entity attribution error Other task misperformance Delivery failure, Collateral managementfailure, Reference Date Maintenance.
		Monitoring and Reporting	Failed mandatory obligation Inaccurate external report (loss incurred).
		Customer Intake and Documentaion	Client permissions/disclaimers missing Legal documents missing incomplete
		Customer /Client Account Management	Unapproved access given to accounts Incorrect client records (loss incurred) Negligent loss or client assets.
		Trade Counterparties	Non-client counterpary misperformance Mise. non-client counterparty disputes
		Vendors and Suppliers	Outsourcing vendor disputes

Assessment Approach

1 Input to Risk Catalogue

The required inputs to the risk catalogue must be able to adequately assess both the frequency of failure occurrences and severity of loss in order to obtain a measure of net operation risk.

Frequency of occurrences can be assessed using internal reports as well as external reports. These reports include:

▶ Audit reports
▶ Regulatory reports
▶ Management reports
▶ Expense reports
▶ Deviation from business plans
▶ Operational plans

Severity loss can be assessed from:

▶ Management interviews, both pre and post mortem
▶ Variance on budgets
▶ Insurance claims
▶ Loss history

2 Risk Assessment Scorecard

A risk assessment scorecard is used to assess each business or operational unit with the help of risk catalogue and inputs from step 1. Risk assessment scorecard will identify and assess the nature of operational risk based on the following broad points:

▶ Risk categories such as people, process, technology and external dependencies
▶ Connectivity and interdependencies among the risk categories
▶ Change in work environment
▶ Complexity of products, processes or technology
▶ Complacency factor due to ineffective management of the unit
▶ Frequency and severity assessments
▶ Net operational risk, evaluated net of risk mitigants

The final result is the net risk assessment.

3 Review and Validation

Once the risk assessment is completed, operational risk management committee must review the assessment results with the management of the respective business unit and other key officers of the institution. Some of the responsibilities of the committee include:

▶ The committee must formulate a set of operational risk policies and guidelines, which clearly determine the actions needed to correct and prevent the operational problems and issues.
▶ It should determine the important difference between the unit's own self-assessment and the independent assessment.
▶ It should express opinion on the risk rating in the risk scorecards before publication.
▶ It should issue mandatory report and list of recommendations to the affected business units in conjunction with audit and compliance departments.

Output of assessment process

Operational risk assessment process can have several outputs. These outputs can be broadly categorized into three items. They are:

1. Improved risk reporting and analysis:
One of the important outputs of operational risk assessment process is the risk report. These reports provide relative information on operational risk exposures across the institution. Some of the important reporting tools are: risk catalogue, risk scorecard and heat map.

2. OCC exam chart
Outputs of risk assessment process such as risk scorecard and other reports helps to graphically represent the evaluation of business unit in a concise manner in line with the OCC examination procedure.
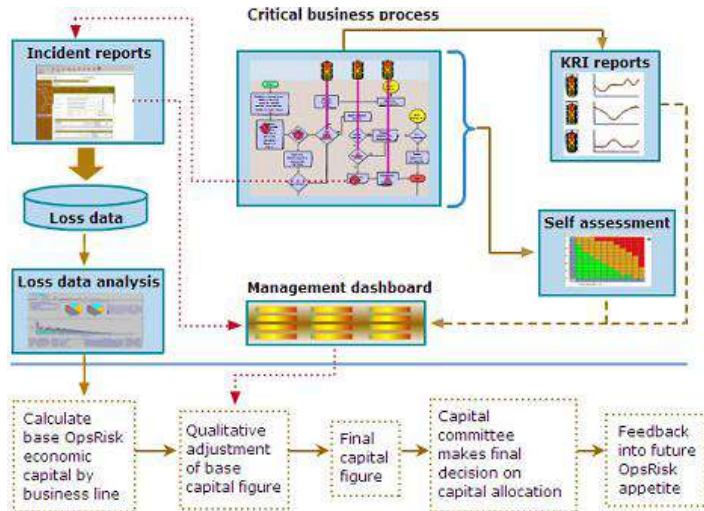
3. Capital attribution
Risk assessment report assist in attributing economic capital to operational risk. Business units, which are more prone to operational failures, are assigned a greater allocation of capital commensurate to the risks that they take.
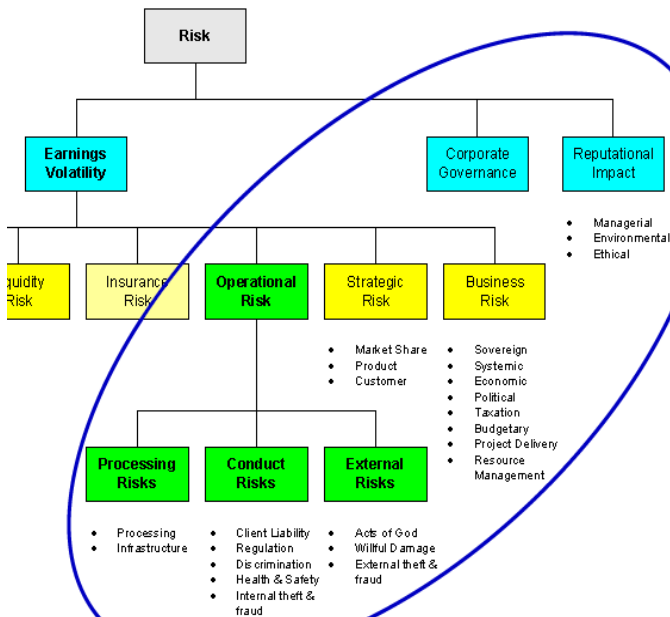
OR Tools

Legend: ■ - Yes, currently in place ■ - No, but plan next year ■ - No plans
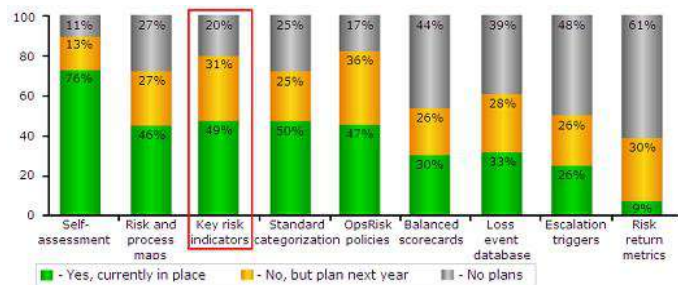
OR Management System

Operational Risk Management System
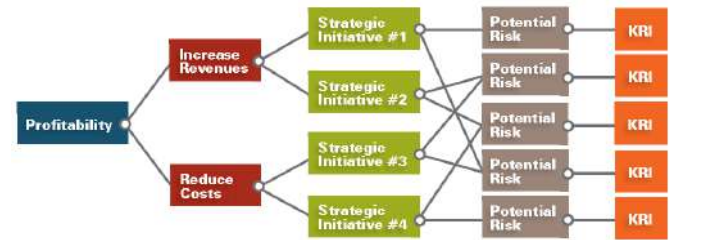
OR in the context of risk

Key Risk Indicator (KRI)

Key risk indicators (KRIs) = measures to signal rising OR or to assess OR exposure

12 KRI

❶**Audit Issue Management Index** number + severity audit issues not yet resolved ❷**Business Continuity Index** vulnerability & criticality of processes, quality of continuity plans, frequency & adequacy of practices / tests ❸**Failed Customer Interactions Index** number, duration & severity of failures to provide customers with prompt, reliable, effective service ❹**Information Security Index** number & severity of virus attacks, critical vulnerabilities left unresolved for significant period, security events with client impact ❺**Information Technology Index** availability of technology at critical periods for critical purposes ❻**New Product Index** rate of introduction of significant, new products with major implications for people, processes or systems ❼**Operational Losses** dollar amount of losses ❽**Process Breaks Index** rate, severity and size of trading, clearing and settlement failures and customer impact ❾**Profitability Index** number, suddenness and severity of

unexpectedly high profits or losses ❿**Policy Exceptions Index** number & significance of policy exceptions ⓫**Regulatory Index** number & severity of comments made and fines levied by bank and regulators ⓬**Staff Turnover Index** turnover rates in critical functions
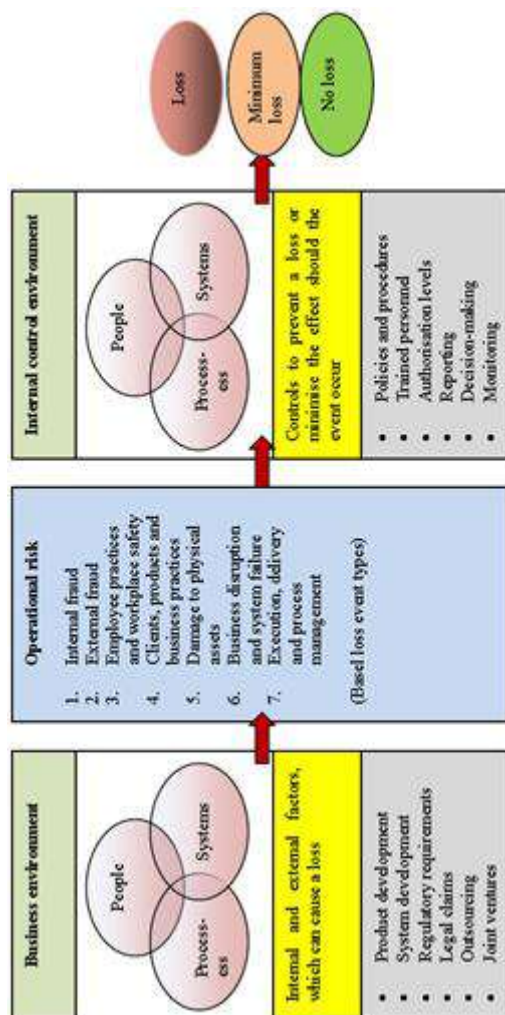
Objectives, Strategies, Risks, KRI's

Objective	Strategic Initiative	Potential Risks	Key Risk Indicators	Strategic Response
Increase earnings through revenue increases.	Promote premium buffet options to attract additional customers.	Customer income levels and discretionary income drop and prevent customers from visiting restaurants or from selecting premium buffet options.	Trends in per-gallon gasoline prices in the chain's geographic markets. Trends in oil futures prices.	Revise marketing to promote more "value" options if gasoline price trends are rising.

KRIs to Inform About Risk of Debt Covenant Default

Risk Event
Debt covenant breach

Intermediate Event
Leading KRIs might include sales trends, cash on hand, changes in short-term borrowings, etc.

Root Cause Event
Leading KRIs might include customer financial reports, industry reports, economic conditions, pricing trends, labor issues, plant capacity, etc.
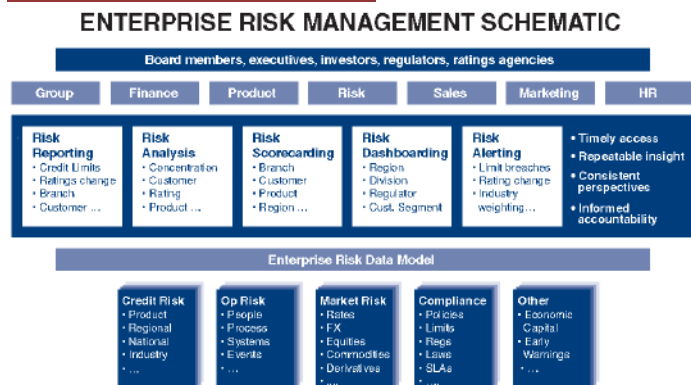
HOOPP

Middle office processes

①Financial report ②Origination ③Maturities/ amend ④Reconciliation ⑤Settlement/custody ⑥Valuation

Collateral Business

•$40B in assets •Security lending + REPO + OTC •Collateral book ~ $20B (pledged, etc) •C/P derivatives 20 SECLEND 10 REPO 12

Straight-through Processing STP

📖SCD STP

Dodd-Frank

❶**Swap Dealers (SDs)/ Major Swap Participants (MSPs)** Dodd-Frank ⇨ full set of regulatory requirements (capital, margin, business conduct, etc.) ❷**Financial Users of Swaps** subject to clearing, trade execution, reporting and, if the counterparty is an SD/MSP margin, documentation and other requirements ❸**End-Users** exempt from clearing and

trade execution for swaps used for hedging; but proposed margin rules require margin arrangement (although no specified margin amount reporting required) ❹**Central Banks** excluded from clearing and from SD and MSP registration
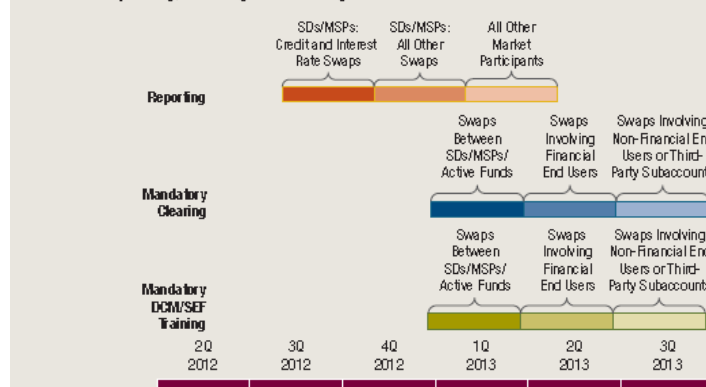
HOOP considerations

❶**Trade Execution** eligible swaps traded on electronic platform e.g. **SEF Swaps Exchange Facility** ❷**Derivatives Clearing Member DCM** - one or many ❸**Affirmation/ Confirmation** OTC trades affirmed/confirmed on **T+0** in order to be cleared (currently, *trade date+10-plus business days* paper confirmations return from counterparties ⇨ must use electronic platforms (e.g., DTCC and MARKITWIRE) for T+0 basis ❹**Margining** must post Initial Margin and daily variation margin ❺**Pricing** in order to agree on margins, must receive clearing houses prices ⇨ different from internally generated prices? process for obtaining/ verifying prices? ❻**Risk Management** DCM/ Clearing House for counterparty risk management ❼**Trade Repositories** OTC swaps to be reported to trade repositories, similar to credit default swap deals currently in **Depository Trust & Clearing Corporation DTCC Trade Information Warehouse TIW** ❽**Legal Document** ❾Clearinghouse prices for accounting purposes? Reconciliation between internally generated and clearing house price sufficient How to account for variation margin? ❿**Integration and workflow** ◆Training and documentation ◆Controls

HOOPP Plan

❶**Key deliverables** ◆Configure SCD to calculate/ post daily **Variation Margin VM** (using FX rates and 'data consolidator' prices) ◆Recon SCD VM to DCM VM ◆Shadow replication processing (for reporting) ◆FX flattening per DCM ◆SCD Accounting configurations for VM ◆SCD to NT Cash Recon, adjustments for VM Netting ◆Revise collateral process to deliver initial margin on T+1 ◆Setup collateral pools and haircuts for each DCM ◆Modify reports for VM/DCM changes ❷**Recon's (IRS and CDS)** HOOPP to MARKIT Position Recon ❸Data Integrity Reports (IRS/CDS) ◆Trade flow data integrity ◆Price feed data ◆FX feed data integrity ❹**IT infrastructure** FTP, batch jobs and scheduling ❺**Operational procedure/ process change** training/ documentation

System capabilities for OTC derivatives central trading and clearing

❶Support enterprise data management for a 360° view of risk/ performance ❷Automate position valuation & generation of variation margin ❸Automatically reconcile discrepancies against transacting counterparty ❹Support full straight-through-processing (STP) workflow for OTC swaps ❺Provide transparency in trade transaction flow for full disclosure ❻Communicate real-time details of trades and collateral to all relevant parties ❼Provide broad instrument coverage that includes centrally & bilaterally cleared trades plus instruments outside of Dodd-Frank ❽Support real-time reporting to reflect the most up-to-date view of positions and trades

Straight Through Processing STP

Market infrastructure

Market Infrastructure	Credit	Interest Rates	Equities	Commodities	FX
Execution/Trading	Creditex, GFI/CAP, BGC, TradeWeb	TradeWeb, ICAP, BGC	TradeWeb, ICAP, BGC	ICAP, BGC	TBD
Affirmation/ Confirmation	MarkitSERV, BBG (VCON), ICELink	MarkitWire, BBG (VCON)	MarkitSERV	Swift	TBD
Central Clearing (CCP)	ICE, CME, EUREX	LCH, CME, IDCG	NYSE Bclear, Eurex (Q4 2011)	CME, ICE	
Repository	DTCC	TriOptima	DTCC	CME, ICE	TBD
Valuations	Markit, Superderivatives, CMA, Lombard				
Payment/Settlement	CLS/Swift	PPS/Swift	Swift	Swift	CLS
Reconciliation	Markit, Omgeo/Allustra, Lombard, Euroclear, Smartstream, TriOptima				
Portfolio Compression	Creditex/TriOptima	TriOptima		TriOptima	-

HOOPP Process for transacting & clearing a trade

1. HOOPP and Dealer agree to trade through electronic trading platform
2. Dealer Alleges trade on Matching Platform
3. HOOPP affirms trade, selects it for clearing and designates a Derivative Clearing Member (DCM)
4. Matched/Affirmed trade is sent to Clearinghouse
5. Clearinghouse checks overall DCM limits and id ok sends confirm to DCMs
6. DCMs checks clients limits and accepts trade at Clearinghouse
7. Clearinghouse generates clearing confirm to Matching platform
8. Matching platform sends clearing message to trading parties
9. DCMs send statement, margin calls, etc. to HOOPP
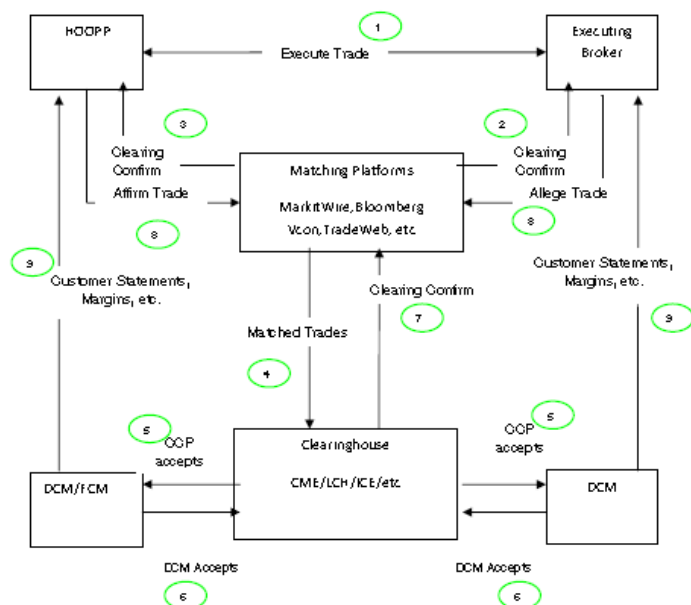
SIMCORP

&HOOPP, More on HOOPP &HOOPP Treasury &Securities Lending & Collateral Administration &Workflow Equity, Derivatives, FX, Fixed Income &SCD Equity &SCD Fixed Income &SCD Upgrade &Fair Value Continuity &More on SCD &SCD Lexicon

On SCD EQUITY

On Collateral

On SCD Fixed Income

Functions & Modules

SCD Solutions Portfolio
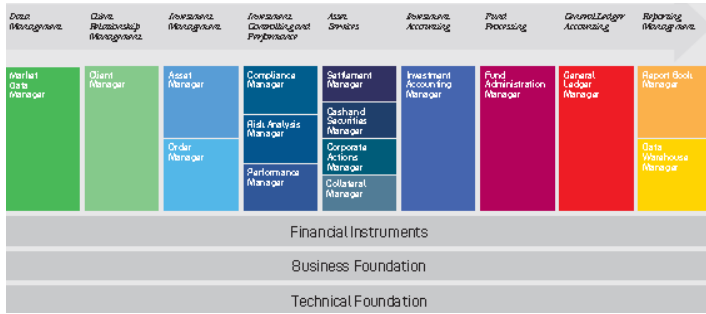
SCD Data warehouse
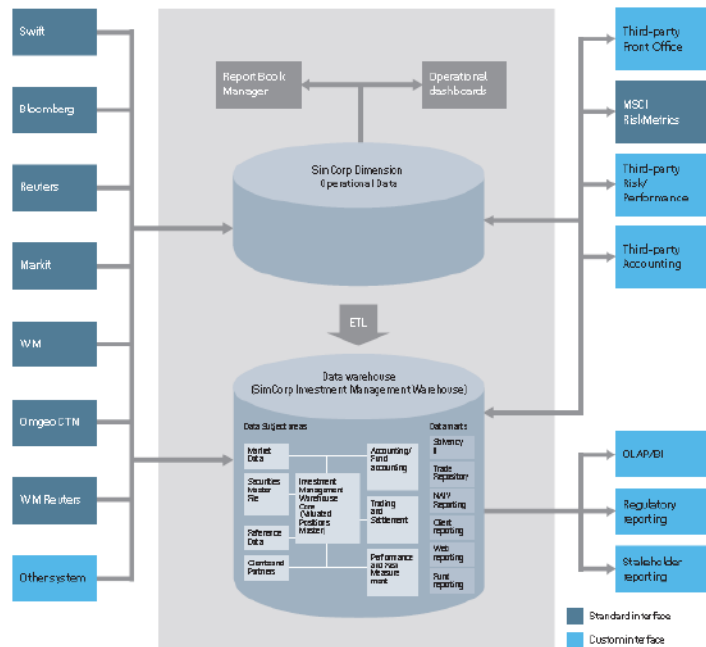
ARCHITECTURE	ETL MANAGER
· Single source of truth	· Logic-based mapping
· Data harmonization	· Management database for ETL logic
· Sign-off functionality	· Configurable validation logic
DATA MODEL	· Logging of all ETL processes
· Multi GAAP	· ETL logic managed via portal
· Multi Entity	· Automatic dispatch of status notifications
· Decomposition	
· Data History	

AIDC Financial Management and Treasury

IT integrated with Financial Management (treasury, risk management and quantitative applications) TREASURY AND COMMODITIES responsible for pricing AUD, trading electricity and wool derivatives, new pricing models: *endowment warrants*, *share ratio options* and or *exotic options*. One of main activities was to integrate diverse range of treasury products into a single treasury system •**Size**: $5B in managed assets- total income $40M- Project finance, equity & debt- Treasury- Trading government & corporate debt instruments

Manulife OTTI (Other than Temporarily Impaired)
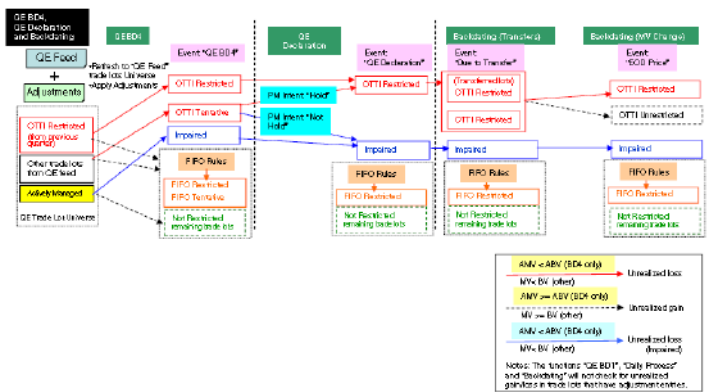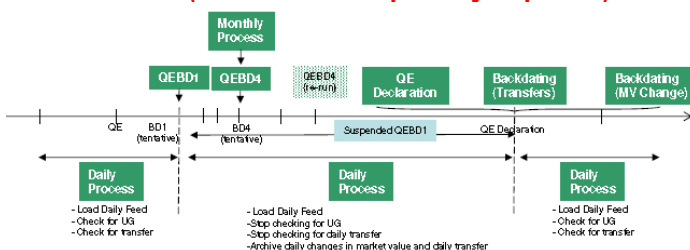
AIA/AIG

• Underwriting, claims and POS (Policies) • Products: Endowment (EA), modified anticipated endowment special (MAES), Life endowment special (LES), Yearly Renewable Term Assurance (YRTA) • Riders: Accidental death benefit (ADB), Accident medical reimbursement (AMR), Accident Hospital income (HI) **AIG Size** •AIG: #1 market cap $200B (2000), 91.3% life premium in Asia; AIA revenue $5B, PCI Bank, PhilAmlife, AIG SunAmerica, AIG Private Bank

P&C

◆Develop automobile insurance ◆3rd-party liability ◆Accident benefits ◆Uninsured motorist coverage ◆General provisions, definitions, exclusions ◆Statutory conditions,b prescribed conditions (BC), mandatory conditions (Nova Scotia), policy conditions (Quebec) ◆Loss of or damage to insured car ◆Endorsements ◆Applications, underwriting

AIG Credit Card

AIG Credit Card Company Philippines owned by AIG Consumer Finance and sold to PhilAm Savings bank •Rapid prototyping •Payment Card Industry Data Security Standard (PCI DSS) •Marketing & acquisition practices, effective campaigns •Tech infrastructure supporting credit & debit products, services, fraud detection, security, compliance, marketing, distribution & sales

CIBC Control

CIBC 20 Services (Financial)

AUDIT	Admin of Non-Core loans.
FINANCE	Advertisement Costs
GLOBAP OPS	AR, AP
HR	Business Analysis
LEGAL	Call Centre Supports products for Commercial Banking
MARKETING	Compliance
RETAIL	Fees (Directors, OSFI)
RISK	Financial Analysis
TECH SERV	Financial Ombudsman
WORLD MARKETS	Financial Risk Support
WEALTH	HR - Compensation
	HR - Compliance
	Management Costs
	Project Management
	Resource Centre - reports (M&A, Green sheets, Prospectus') and internet searches
	Stock services
	TI/TS Application Support Cost
	TI/TS Technology Services Cost

CIBC Processes (FCU)

BUSINESS_PROCESS	SUB_PROCESS
A/P	Accrual
Interco loan	Account for loan payable to treasury
Outstanding Cheques Clearing	Accounting Outstanding Cheques
Accrue Liabilities	ID significant individual liabilities
Accrue Obligations related to Securities	Record Repos Position
	Record Securities Sold Short Position
Calculate/ Collect Mortgage Income	Originate a mortgage - recording of acquisition costs on mortgage origination
Income Taxes Note Disclosure	Compilation of Note Disclosure
Note Disclosure Aging of Deposits	Demand, Notice & Term Deposits
Note Disclosure IR Sensitivity	Loans & Deposits Aging & yields
Note Disclosure Mortgage and customer Loans	Mortgages & Consumer Loans

Process	Sub Process
Note Disclosure Segment info	Establish customer CIF (name, address, & permanent information)
Defer Acquisition Cost on Mortgages	Calculate/invoice acquisition cost Prepare amortization schedule
Defer Payments to Loblaws	Defer Acquisition Cost of acquiring credit products and points
EUC Applications	General Controls
Financial Statements Preparation	Compilation of Notes to the Financial Statements
Get a mortgage loan on the books	Funding Mortgages
Get the Loans on the books	Attach credit - PLC Disburse Funds for Personal Loans
GL/source system balancing	Automatically compare ICBS and GL:M balances
HR	Bi-weekly review of payroll register (Including New Hire, Transfers, and Terminations)
ICBS Application Controls	AS400 Recovery Change Management ICBS Incident & Problem Management Process
ICBS Information Security	Security Administration
Maintain customer demand (chequing) deposit	Calculate and accrue daily interest Maintain interest rates Transaction Cheque Clearing Transaction processing - EFT Transaction processing - POS, ABM, Internet, TB - on Tandem
Maintain customer loan	Maintain interest rates in ICBS Recognize interest calc & accrual Transaction Processing - Payments or PLC cheques
Maintain customer notice (RSP) deposits	RSP Renewal
Maintain customer notice(savings) deposit	Transaction processing - Internet, ABM, TB (transfers only) - on Tandem
Maintain residential mortgages	All sub-process Apply payments to Int. income and principal / Accrue Int. at month-end Determine mortgage interest rates
Manage Bank Accounts	Balance & Settle A/P Bank Account Balance & Settle ABM Unpostable, All EFT Return Bank Accounts Balance & Settle ABM, POS, RB, SCD, Plus, Outbound EFT Bank Accounts Balance & Settle Cheque Clearing Balance & Settle EFT Bank Account Balance & Settle General Operating, Treasury, Mortgage, EFT, USD Bank Balance & Settle Guarantee Payments Bank A/C Drafts & MO Balance & Settle Guarantee Payments, Cheq Clr Bank A/C Loans Balance & Settle Payroll Bank Balance & Settle Treasury Bank A/C
Manage Suspense Accounts Other Misc Suspense Accts	Manage Operating Suspense A/C Accounting Items in Suspense A/C
Purchase & pay for non interest expenses	Pay Outside Services (Amortized Trailer fees / Commissions) Pay Other Misc Expenses
Purchase & pay other expenses	Pay Other Expenses
Recognize deferred taxes	Book Monthly Tax Recovery Determine monthly tax rate - Acct
Recognize fee income	Recognize Amicus ABM Surcharge Recognize Interac Charges (convenience fee auto charged for each customer txn) Recognize Returned Cheque Fees
Recognize FOREX non-trading income	Recognize other income

CIBC 26 Processes (OPC) – 113 Sub-processes

Process	Sub Process
Brokerage & Trade	Broker Services - Cash Processing Broker Services- Collateral Management Cash Management Cash Management - Collection of Foreign Cheques Cash Management-Cheque Issuance Cash Management-Incoming wire payments/Cheque deposits Cash Management-ISI Liasion Desk/Bank Reconciliation- Break Resolution CP Issuance - Billing CP Issuance - Book Based Maturity CP Issuance - Physical Maturity CP Issuance-DCS Settlement CP Issuance-Physical Settlement Domestic Equity /Bonds Settlements Equity Arbitrage Futures & Options Settlements GIC Settlements Institutional Equity Settlements - Equity Arbitrage International Settlements Money Market Money Market DTC/FED Settlements Money Market US Settlements- Physical Trades Over The Counter Receipt of Securities Over The Counter/Branch Receipt of Securities Safekeeping Security Lending and Borrowing Segregation Management Stock Transfers UK Securities Lending
Compliance	COB Disclosure
Credit Mgt	Monitor Credit
Customer Satisfaction	Customer Complaints Management Customer Restitution
Derivatives Settlement Operations	Confirmations Post-Settlement Investigations Pre-Settlement Investigations Settlements
Foreign Exchange	Booking
Maintenance	Account Information Maintenance Customer Information Maintenance Operator Profile Maintenance Suspense Account Maintenance
Manage and Monitor the Imperial vehicles	Execute Transactions Identify Substitute and Replacement Assets Reporting
Management Processes	Investments Lending Procedures Information Regulatory Compliance Sales Management
Origination	Adjudication Application Processing Funding & Disbursement
Origination (Commercial)	Adjudication (Commercial) Funding & Disbursement (Commercial)
Outsourcing	Outsourcing - ADP
Payments Processing	Cash Settlements Credit Administration Investigations Reports Balancing Sanction Filtering Validation & Message Repair
Portfolio Management	Credit Derivative Hedging Credit Derivative Trading Establish Portfolio Strategy Hedging Portfolio Management
Proprietary Products	Account Maintenance (CM, Talvest and SI only) Account Opening (PPS) Account Opening/Closing/Transfers (CM/Talvest only) Client Tax Reporting / Tax filing Financial Transactions/ Adjustments Trust Accounting
Registered Products	3rd Party Settlements - Brokerage 3rd Party Settlements-Fixed Term Account Transfers (Internal)-Fixed Term Adjustments - Brokerage Adjustments-Fixed Term Client Support-Fixed Term Deposits-Fixed Term GL Reporting-Fixed Term Monitoring & Compliance - Brokerage Tax Reporting - Brokerage Tax Reporting (GIC Withdrawals)-Fixed Term Transfers - Brokerage Withdrawals- Brokerage Withdrawals-Fixed Term

Sales Fulfillment	Lending - Personal Loan Products
	Lending - Small Business Loan Products
	Small Business Account
Sales Origination	Account Open - Personal Deposits
	Account Open - Small Business Deposits
Security &Control	CSP Application Processing
	Database Control
Service - Inventory Control	Ordering
Servicing	Annual Statement
	Call Center
	Discharge
	Early Renewals
	Product Changes
	Renewals
	Taxes
	Transaction Processing
Servicing (Commercial)	Annual Portfolio Review
	Renewals (Commercial)
	Transaction Processing (Commercial)
Technology Mgt	IT Access Control
3rd Party Mutual Funds	Processing
Trade Finance	Documentation Verification
Transaction Processing	Centralized Instruments Processing
	Cheque Processing
	Deposit Processing
	Inter Branch Payments (IBP) Processing
	Withdrawal Processing

CIBC Legislative Compliance Management (LCM)
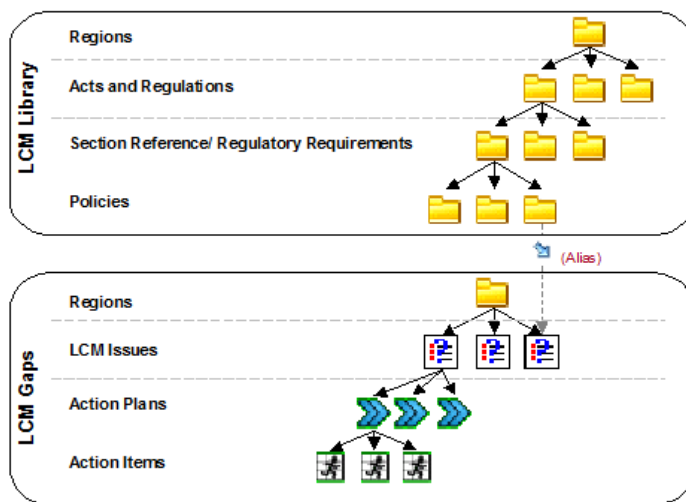
British Columbia Workplace Technology Services

Balance Scorecard and Performance Measures

Learning & Growth - Customers

GOALS	OBJECTIVES	STRATEGIES We will…	KEY INITIATIVES
1. We create a great place to work	Engage Employees	☑ foster great employee/manager relationships and develop leaders at all levels of the organization ☑ attract, retain and develop great team members	◆ Implementation of HR Strategy component: • Leadership Development program • Recruitment plan • Succession plan • Career planning program • Workplace Environment Survey follow-up • New employee experience program
Balanced Scorecard Perspective: **Learning and Growth**	Create a Positive Work Environment	☑ improve organizational pride for employees ☑ make our physical environment a more effective and welcoming workplace ☑ create an environment that supports work/life balance and health for individuals ☑ promote fun in our business environment	◆ Establishment of a 'WTS leadership team' of employees from all levels ◆ Short- and long-term solutions based on relevant 'people' theme input from employee Open Space sessions ◆ Physical Environment Improvement project
2. We respond to the needs of our customers	Anticipate the needs of our customers	☑ know industry trends ☑ know our customers and their business ☑ plan effective solutions, in partnership with our customers, to meet future customer and government needs	◆ Customer engagement strategy ◆ Development of committee across lines of business to develop and implement the sharing of knowledge internally ◆ Implementation of a knowledge management tool to capture and share client information
Balanced Scorecard Perspective: **Customers**	Improve customer service	☑ promote a customer-focused culture ☑ measure and improve the end-to-end service delivery process ☑ streamline order management processes ☑ build flexibility into our solutions	◆ Creation of client-focused competency, fostered through EPDPs and specific training ◆ Service Development Lifecycle ◆ Business Transformation Initiative

PERFORMANCE MEASURE	BASELINE 2007/08	ANNUAL TARGETS			REPORTING FREQUENCY
		08/09	09/10	10/11	
1. a) Workplace Environment Survey (BC Stats)					
◆ Overall employee engagement score[13]	63	65	67	69	Annually
◆ Empowerment[14]	65	67	69	71	Annually
◆ Vision, Mission, Goals[15]	61	63	65	67	Annually
◆ Supervisory-level management[16]	62	64	66	68	Annually
1. b) Employees with EPDPs completed	New	100%	100%	100%	Quarterly
1. c) Employees participating in personal leadership development activities[17]	New	50%	50%	50%	Quarterly
2. a) Customer Satisfaction Survey overall score (BC Stats)	73%	76%	78%	80%	Annually
2. b) Ordering experience					
◆ Order entry[18] (score from BC Stats Customer Satisfaction Survey)	14%	25%	50%	75%	Annually
◆ Order rejection	New	Baseline and targets to be developed			Annually
◆ On-time delivery of catalogue services	New	Baseline and targets to be developed			Annually
◆ Billing (score from BC Stats Customer Satisfaction Survey)	New	Baseline and targets to be developed			Annually
2. c) Understanding customers and building relationships					
◆ WTS Staff participating in a customer site visit[19]	New	20%	25%	30%	Quarterly
◆ WTS Staff attending a client-led presentation (at WTS or client site)	New	30%	55%	75%	Quarterly
2. d) Serving Customers					
◆ Urban workstation incidents remedied within four hours	90% *	85%	85%	85%	Monthly
◆ Rural workstation incidents remedied within eight hours	91% *	85%	85%	85%	Monthly
◆ Remote workstation incidents remedied within 12 hours	93% *	85%	85%	85%	Monthly
◆ Service Desk (7-7000) Workstation Services (score from BC Stats Customer Satisfaction Survey)	72%	74%	76%	79%	Annually

* Our goal is to meet or exceed our current baseline attainment; however, our published targets reflect contractual commitments.
Baseline and targets – to be developed during 2008/09

Internal Business Processes and Financial

GOALS	OBJECTIVES	STRATEGIES We will…	KEY INITIATIVES
3. We provide value	Become a more effective organization	☑ improve internal processes and integration within and across WTS ☑ manage our contracted services effectively giving overall benefit to our customers ☑ build our internal capacity	◆ Employee Move/Add/Change or User Provisioning ◆ Investment Approval Process Review ◆ Automated Portfolio Management
	Deliver integrated, quality solutions	☑ manage our existing services with continuous improvement ☑ design and implement a responsive model for delivery of new services and solutions ☑ deliver solutions as identified in government's IM/IT plan ☑ deliver green IT solutions	◆ Benchmarking ◆ Strategic Transformation and Mainframe Services ◆ Videoconferencing ◆ Cross-government building access system ◆ Identity management ◆ Wireless LAN – Wi Room
Balanced Scorecard Perspective: **Internal Business Processes**	Grow our business	☑ brand and market WTS to demonstrate our value proposition and grow our business ☑ provide increased services to existing customers ☑ support on-boarding of broader public sector organizations into existing supply arrangements	◆ Personal BCeID service deployment ◆ Refresh/Upgrade 2 • Desktop Power Management • Advanced Communication and Collaboration
4. We are trusted	Be open and transparent	☑ manage our finances responsibly ☑ communicate information to customers in a timely manner ☑ communicate effectively within our lines of business and across WTS	◆ Establish formal WTS Financial Accountability Structure ◆ Formation of a WTS Finance Committee to strengthen the WTS Financial Accountability Structure ◆ Ongoing use and continuous improvement of the WTS Financial Control Framework imple-mented as part of WTS Business Transformation Initiative
Balanced Scorecard Perspective: **Financial**	Become a performance-based organization	☑ manage and report on organizational performance ☑ manage and report on service levels	◆ New comprehensive Strategic Business Plan ◆ Performance measures for WTS and quarterly reporting ◆ Pilot ministry service level reporting with Ministry of Transportation

PERFORMANCE MEASURE	BASELINE 2007/08	ANNUAL TARGETS			REPORTING FREQUENCY
		08/09	09/10	10/11	
3. a) Comparison of WTS service rates against similar industry services	New	Baseline and targets to be developed			Annually
3. b) WTS services that meet at least 90% of established service levels	New	85%	85%	85%	Monthly
3. c) Extent to which WTS is recognized as a leader in IT shared services (qualitative measure)	Awards, inquiries from other jurisdictions, environmental scan, press clippings				Quarterly
4. a) Per cent of WTS catalogue services with published service levels that are reported on a regular basis	New	Baseline and targets to be developed			Quarterly
4. b) Financial Management					
◆ Variance from adjusted Q3 forecast	New	3%	2%	1%	Annually
◆ Achieve $1,000 vote requirement	$4,547K	<$500K	<$500K	<$500K	Annually

Corporate Accounting System (CAS)

Corporate Accounting System (CAS)

Corporate Accounting Services provide benefits from economies of scale to enhanced security, accuracy, availability and reliability of government's financial data for customer and corporate decision making. A mandate from the Office of the Comptroller General (OCG) is in place requiring all government entities that are part of the Consolidated Revenue Fund (CRF) to share a single set of books and to process their financial transactions through the government-wide financial system. This consolidated approach eliminates the need for duplicate or partial "shadow" financial systems across government. All financial information is consolidated into one system for making payments; issuing invoices and T4As; auditing and reporting; and, publication of the Public Accounts (i.e., the 'Blue Book'). The OCG relies on the system as the "one source of truth" for government financial data. No other organization within Government provides similar products or services to those offered by Corporate Accounting Services.

The Oracle Financials eBusiness suite of applications and databases, described briefly below, comprises the corporate enterprise financial system that allows the BC Government to process and record all financial transactions.

CAS - General ledger: The General Ledger module (GL) is a complete financial management system for provincial government ministries and agencies. Budget information is loaded into CAS Oracle Financials as is the Chart of Accounts. The GL module is updated from all sub-systems (Accounts Payable, Accounts Receivable, Purchasing, and Fixed Assets), as well as from CAS Generic Interface (CGI). The GL is updated instantly on-line for all manually entered and posted journals. The GL module is composed of several functions that users access to enter and correct journals, run reports and inquire on data entered either directly or through one of the sub-systems and interfaces.

CAS - Accounts payable: The Accounts Payable (AP) module is used primarily to enter and adjust invoices. The Accounts Payable module is also used to run reports and to review invoices, invoice batches, payments, and the accounting and encumbrance entries for individual invoices and payments.

A payment process is run each business day to generate payments of all types. The accounting entries are then transferred and posted to the General Ledger.

CAS – Budget: The Budget Module provides a common system for BC government and non-BC government staff to build and maintain their budgets. Both the estimates (e.g., 'Blue Book') and working budgets maintained in the Budget Module may be posted to CAS Oracle General Ledger. The Budget Module allows one to maintain multi-year budgets.

CAS - Chart of accounts: The Chart of Accounts (COA) Module provides a common system for BC government and non-BC government staff to build and maintain their chart of accounts and post them to the CAS Oracle General Ledger. The Chart of Accounts also provides the ability to develop and maintain Rollup Hierarchies used to report on budgets in the Budget Module.

CAS – Contract management: Contract Management is an extension to the government's corporate accounting system. It integrates the creation and administration of contracts with the government's financial systems.

CAS – Fixed assets: The Fixed Assets module (FA) is a complete assets management tool used to enter and maintain capital and attractive assets information including Construction In Process (CIP) assets. Asset maintenance includes the transfer, retirement and disposal of assets, as well as depreciation, calculation of gains and losses, and capitalization functionality. The Fixed Assets module allows the definition of depreciation methods and ceilings, as well as the creation of journals to be posted directly to the General Ledger.

CAS - Expenses reporting (iExpenses): iExpenses is a web-based application used by employees to enter and submit expense reports for reimbursement of business travel expenses. Through iExpenses, employees can check the status of their expense reports, view payment information, and access their notifications; approved Expense Reports are imported to accounts payable. iExpenses is an Oracle product.

CAS - Purchase requisitions (iProcurement): iProcurement is a web-based application used to enter requisitions to initiate the purchase of goods and services sourced through Corporate Supply Arrangements (CSAs), BC Bid, or by Ministries. Expense Authorities approve these requisitions through workflow notifications. Approving requisitions updates the General Ledger.

Requisitions are auto created onto on-line Purchase Orders (POs) in the Purchasing module, drawing down the commitment encumbrance and increasing the obligation encumbrance balance in the General Ledger. PDF documents are generated for communication with the supplier.

iProcurement is also used to acknowledge receipt of goods and services before invoices are matched to POs in the Accounts Payable module. iProcurement is an Oracle product.

CAS – Data Warehouse Reporting and Analytic Tools: The CAS Data Warehouse (DW) has been designed for ministry reporting. The Data Warehouse tables are refreshed on a nightly basis and are current as of the close of the previous business day in CAS Oracle Financials. They contain data from the BC Government's Oracle Financials implementation of the "single set of books" as well as data for entities that do not fit into protocols defined for inclusion in the government set of books.

Currently the following reporting functionality is available either directly through the financial application or through the data warehouse. Express Financial Reports (EFR) are defined reports with a fixed set of parameters, intended to produce a basic report frequently generated. Standard Financial Reports (SFR) are similar to EFRs but they contain additional parameter selections, which allow for limited sorting capability and display options. These reports are intended to produce a slightly more detailed report than the EFRs. Web Form Reports (WFR) are a dynamic suite of reports that can be created and displayed in a variety of ways based on customers' selections. Workbooks are a collection of worksheets and, optionally, graphs that contain data from a particular business area that is organized to show different perspectives. In order to facilitate faster processing times for inquiry and reporting functions, data in the data warehouse is grouped into subject areas like AP, PO, AR, etc. Customers can also download data extracts.

Enhancements to real time financial reporting and business analytic reporting are growth areas for Corporate Accounting Services. In 2005, CAS developed a reporting and information strategy and has been systematically assessing and testing available tool sets that will provide role based dashboards and drilldown capabilities for executive decision making. A business intelligence tool has been piloted at CAS.
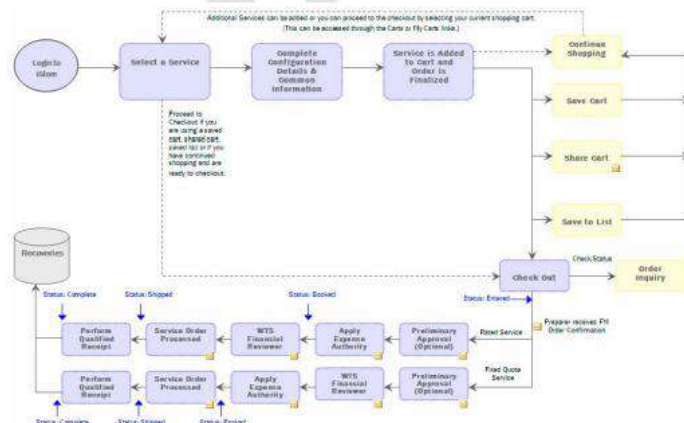
Business Transformation Initiative (BTI)

BUSINESS TRANSFORMATION - INCREMENTAL IMPROVEMENT APPROACH

Phase 1 a/b Financial Stabilization	Phase 2 Service Reliability	Phase 3 Evolve and Sustain
Financial Stabilization and Service Baseline Strategy Stabilize the WTS financial and service delivery foundation upon which to deliver quality IT services	**Service Reliability** Improve, combine and integrate service delivery into consistent service packages	**Evolve Shared Services Model** Evolve and continually improve service quality in a customer-focused and sustainable way and further align with the Shared Services model.

	Phase 1a (Sept '06)	Phase 1b (07/08)	Ph 2 (08/09)	Ph 3 (09/10)
Services	• Simplify descriptions • Understand costs	• Improve descriptions • Initial on-line ordering	• Automated ordering solution • Integrate with SSBC where makes sense	• Consolidated catalogue
Ministry Partnerships	Develop SDAs	• Joint Planning • Improve forecasting	• Partners in planning • Improve time to market • Client Profile	• Integrated Ministry Agreements
Billing	Manual JV	• Manual/Automated billing • Improve financial controls	• Corporate cost mgmt. and consumption tolerance	
Mgmt. Reporting	Interim reporting tool for budgeting	• New financial reporting in CAS DW	• High data integrity • Management information	• Consolidated view of SSBC
Service Delivery		• WTS Internal integration • Propose service standards	• Service Level Mgmt. • Better change and incident management • Integrated services where it makes sense	• Continue to integrate

How was the ordering process improved?

Ordering Process - Before

1. Multiple Points of Entry (Phone, Email, Various Contacts)
2. Complex Rate Structures Technical and WTS knowledge required to order
3. No Automated Financial Controls (Email, Paper, Phone)
4. Multiple Journal Vouchers Detailed and difficult to understand; some surprises with price changes

New Ordering Process - iStore

1. Single Point of Entry (Store – Create Order)
2. Simplified Rate Structures Business knowledge to order
3. Automated Financial Controls (Expense Authority, Preliminary Approver and Qualified Receiver)
4. Monthly Journal Voucher Chargebacks based on approved Orders; less detailed billing

✓ Move to Single point of entry
✓ Simplify
✓ Strengthened Financial Controls
✓ No Surprises
✓ Predictable

What is the high-level iStore ordering process?

iStore orders follow an approval/receipt process with the order status changes recorded and communicated at key intervals, ending with financial recovery (billing). The basic process is outlined below.

What were the main Phase 2 BTI project deliverables?
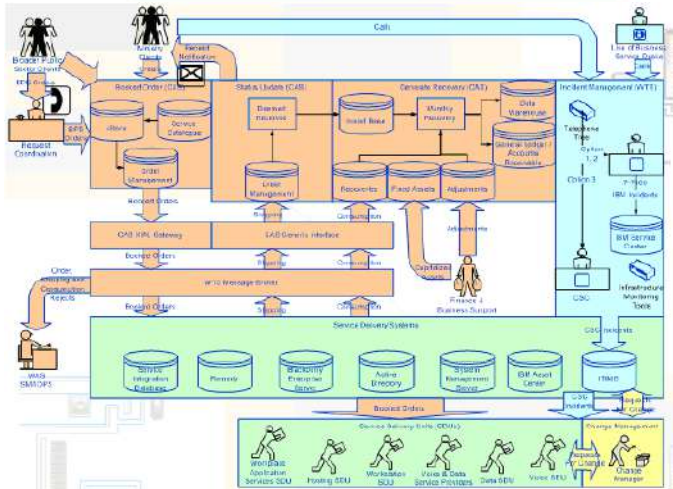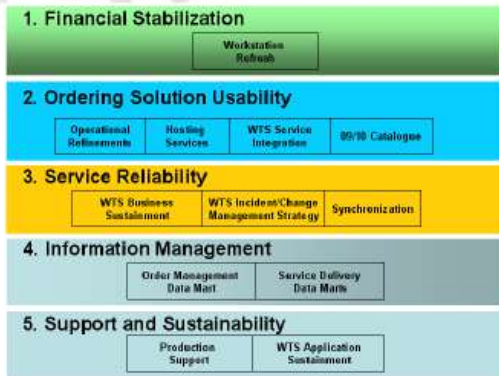
What are the key components that facilitate iStore financial transactions?
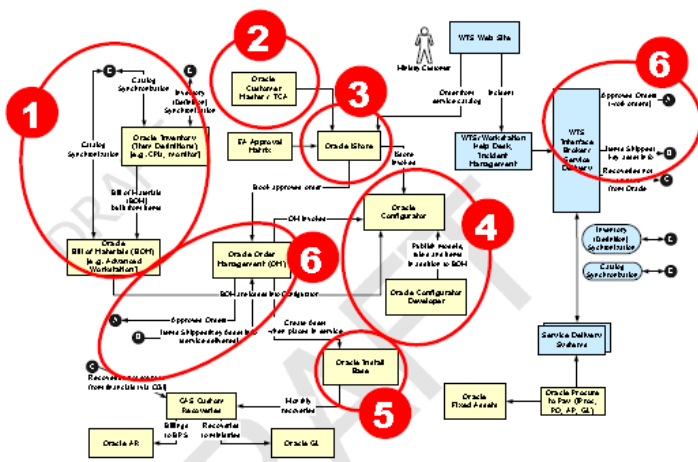
CIBC Mellon

History

CIBC Mellon was founded in 1996 after CIBC joined with Mellon Financial Corporation in a 50-50 joint venture named CIBC Mellon **Global Securities Services (CMGSS)**. The following year, 1997, CIBC purchased a 50% stake in The R-M Trust Company from Mellon, which would become CMGSS's sister company, **CIBC Mellon Trust Company (CMTC)**. CIBC Mellon acquired the Pension and Institutional Trust businesses from Canada Trust in 1997 and the global custody business from the Bank of Montreal in 1999. In 2002 CIBC Mellon acquired TD 3rd party investment fund custody business.

Cash Processing, AR, Revenues Fees

Process	Sub-process	Reports	BMIS	CMS	IAS	Invest One	Gen esys	Swift	CDS X	CIBC	Fee Billing	Cash Stlm	GSS Reconc
02- GSS Cash Processing & Accounts Receivables	2-2. Branch clearing deposits -> CIBC		Yes					Yes		Yes	Yes	Yes	Yes
05- Revenues - Custody Fees GSS	5-2. Process client transactions	Core Custody Interest	No	Yes	Yes	Yes	Yes	Yes	Yes				

Process	Sub-process	Reports
02- GSS Cash Processing & Accounts Receivables	2-1. Cash receipts	Cash & Short Term Deposits
	2-2. Branch clearing deposits -> CIBC	
	2-3. Fee Billing (client pays to bank A/C, cash payments posted in BMIS, A/R reduced)	AR Cash & Short Term Investments "Daily listing of cash receipts.xls"
	2-4. Collections	AR Bad Debt & Recoveries AP
	2-5. Write-offs to Accounts Receivable	
	2-6. Allowance for doubtful accounts	
04- CMT Cash & Accounts Receivable	4-1. Cash Receipts	
	4-2. Collections	
	4-3. Write-offs to Accounts Receivable	
	4-4. Allowance for doubtful accounts	
	4-5. Adjustments to AR	
05- Revenues - Custody Fees GSS	5-1. Fee schedule & Client account setup	Core Custody Interest Revenue
	5-2. Process client transactions	
	5-3. Daily transaction/ holding -> BMIS	
	5-4. Pricing & valuation client Holdings -> BMIS	
	5-5. Other billing inputs	
	5-6. Invoice/revenue calculation	
	5-7. Post revenues to G/L	
06- Revenues - Trust Fees CMT	6-1. Fee schedule & Client account setup	Stock transfer Bonds/escrow
	6-2. Service delivery	Other revenue
	6-3. Enter billing input into BMIS	Special
	6-4. Invoice/revenue calculation	Non traditional
	6-5. Post revenues to G/L	

Business & Process

◆**Distribution and service fees** earned from mutual funds as percentage of average assets of mutual fund investment portfolios managed or administered by Mellon ◆**Asset Servicing Sector** driven by: level of transaction activity and extent of services provided including custody, accounting, administration, daily valuations, performance measurement, securities lending, foreign exchange trading and investment manager back-office outsourcing, market value of assets under administration and custody ◆**Institutional trust and custody revenue/fees** depend on volume of transactions in CM clients' accounts + number of accounts; types of services e.g. performance analytics; level of assets under custody or administered. Revenue includes securities lending revenue, spread earned on reinvestment of cash posted by borrower as collateral; percentage sharing of that earned spread with custody clients who own securities ◆**FOREX trading revenues** ◆**Payment solutions & investor services fee revenue**: cash management revenue, Investor Services revenue, and revenue earned by Financial Markets ◆**Treasury Services/ Activity sector**: ➤Financing-related revenue: returns from corporate-owned life insurance; gains/ losses on securitizations; letters of credit & acceptance fees; loan commitment fees; gains/losses on loan sales/lease residuals. ➤Equity investment revenue: realized/unrealized gains/losses on venture/non-venture capital investments

MIS Dashboards

Balance Scorecard Internal - GSS Trade Settlements

Month	Transaction Volume	Transaction Values	Type	Buy		Sell	
				Transaction Volume	Transaction Values	Transaction Volume	Transaction Values

Balance Scorecard Internal - CMT Securities Transfer

					Total Transfer	
Certificates issued, cancelled and statement		NCI Volumes		NYSE Processing	Estate Transfer
Debit Entries	Credit Entries	Debit Entries	Credit Entries		

Balance Scorecard Internal - CMT & GSS Assets under Administration

	Canada	
Month	Value of Assets	Number of Assets

Balance Scorecard Finance

CIBC Mellon Trust Company		Global Securities Services	
Revenues		**Revenues**	
	Core Fees		Custody Fees
	GSS Deposit Fees		Securities Lending
	Net Interest Income		Foreign Exchange
	Total Revenue		Net Interest Income
Operating Expenses			Total Revenue
	Salaries and Wages	**Operating Expenses**	
	Health Benefits		Salaries and Wages
	Base Staff Expense		Health Benefits
	Incentive Expense		Base Staff Expense
	Total Staff Expenses		Incentive Expense
	Computer, Equipment & DP		Total Staff Expenses
	Occupancy		Computer, Equipment & DP
	Interbank		Occupancy
	Other		Interbank
	Total Operating Expenses		Other
Corporate Items			Total Operating Expenses
	Corporate Items - A	**Corporate Items**	
	Corporate Items - B		Corporate Items - A
	Total Corporate Items		Corporate Items - B
Net Income Before Tax (NIBT)			Total Corporate Items
	Income Taxes	**Net Income Before Tax (NIBT)**	
Net Income			Income Taxes
		Net Income	

Balance Scorecard Client

	Canada			
Month	Client retention rate	# bids in progress	# wins	# losses

Balance Scorecard Learning & Growth

Month	Permanent Headcount	Open Positions	Resignations	# of training days	# of training attendees

Scope
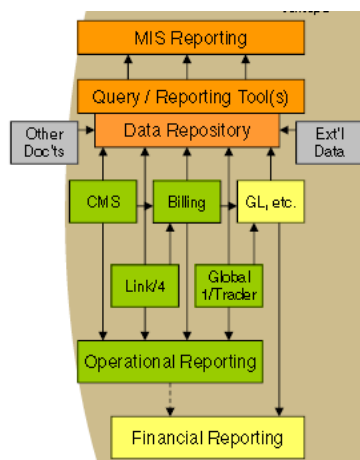
Benchmark Metrics from implementation of Mellon European Financial System (EFS)
- In 2005, Mellon U.S. spent $8.5 Million USD on the EFS Project
  - Implemented Oracle eBusiness Suite for financial management
  - Modules installed:
    - General Ledger
    - Purchasing
    - Accounts Payable
    - Fixed Assets
- Notes:
  - Project costs were revised upwards three times
  - The Mellon Key was devised for use across the Mellon enterprise
- Mellon U.S. is available for ongoing consultation with CIBC Mellon
- Mellon U.S. would consider running the application as a service provider for CIBC Mellon, if the Oracle eBusiness Suite were selected here

Project Plan
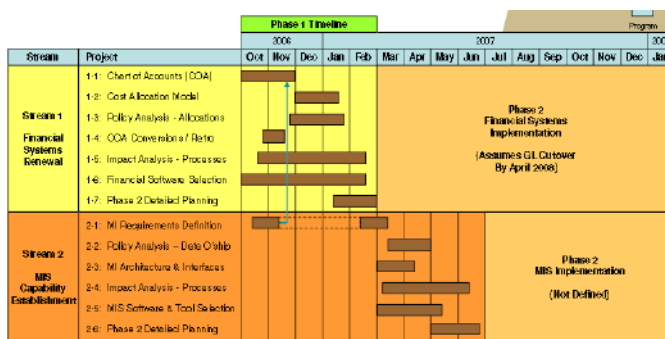
CIBC CAD Chief Accountant Scorecard 2005

Operations

Finance

Customer/Client

Growth

Growing the Franchise	*"Contribution to firm-wide priorities and business/department initiatives such as the brand promise, new product development and applications, portfolio growth, and building a platform that increases leveraging opportunities"*	
Provide ongoing advisory and transactional advise	Internal feedback	•
Promote CIBC's professional reputation through participation & leadership in industry forums	Leadership & participation roles effectively executed in significant industry forums	
Provide leadership support to enterprise governance processes – RLR	FTDC participation	•
Sponsor BASEL II Work streams – ➢ Enterprise Data Supply Facility ➢ Market Discipline Provide active leadership to overall BASEL II programme	Project deliverables met Active participation in programme leadership forums Feedback from Programme Sponsors	•
Through resource management optimize the capacity and capability of the department Reorganize CAD to better meet department's responsibilities	Employee survey results Feedback from employees on capability and capacity	