

Feasibility Study:
Extending Collateralized Portfolio Reconciliations

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Executive Summary

In August 2008, the Counterparty Risk Management Group III (“CRMPGIII”) published a wide-ranging paper on risk management in the financial markets, Containing Systemic Risk : The Road to Reform¹. This included a recommendation V-10 that addresses the need for transaction portfolio integrity between any pair of counterparties, which stated: “The Policy Group further recommends frequent portfolio reconciliations and mark-to-market comparisons, including on collateralized instruments.”

This recommendation refers to the practice, at the time of the CRMPGIII paper not consistently adopted across the OTC derivative market, of two parties to a transaction performing a periodic portfolio reconciliation between their respective records to ensure that (a) the parties agree the existence and general economic terms of the transaction in question, and (b) that they agree the mark-to-market value of the transaction, within reasonable tolerance².

In July 2008, ISDA and derivative market participants made the first of a series of commitments to regulators relating to collateral management, including portfolio reconciliation. These commitments were eventually laid out in a formal Roadmap for Collateral Management³ and led to significant improvements in market practice towards the goals set by CRMPGIII. Amongst these improvements was the adoption by June 30, 2009 of a daily portfolio reconciliation standard between the Fed 15⁴ dealer firms.

Daily reconciliation between the Major Broker Dealers covers an estimated 60%⁵ of the global OTC derivative market, across all asset classes. While this was a significant accomplishment in less than a year from the first formal industry commitment on this topic, it does raise the obvious question : what about the other 40%?

Industry practitioners made a further commitment to answer this question and to understand the feasibility of wider adoption of portfolio reconciliation discipline across the market. This Feasibility Study (the “Study”) discusses the dependencies that exist for expansion of frequent collateralised portfolio reconciliation beyond the current Major Broker Dealers. The Study has been undertaken by representatives of dealer and buy-side firms under the guidance of the ISDA Collateral Committee.

For purposes of this Study, OTC derivative counterparties have been categorised into four principal Counterparty Types (Major Broker Dealers, Other Banks, Buy-Side Firms and End-Users) as defined on page 7. These have been used to classify responses from a Portfolio Reconciliation Survey⁶ (the “Survey”) carried out by the ISDA Collateral Committee to determine current market practices and expectations.

¹ Containing Systemic Risk: The Road to Reform, Counterparty Risk Management Group III, August 6, 2008, New York

² In theory the mark-to-market value of a transaction between two parties will be x from the perspective of one party and $-x$ from the perspective of the other. For various technical reasons, the exactness of this equivalence breaks down in practice, but nevertheless the valuations of the two parties should be reasonably consistent. If they differ materially, this is an indication that the parties either have a valuation methodology difference or some mismatch in the inputs they are using for their valuation processes; in either case, this can lead to disputed margin calls, uncertainty as to credit exposure and difficulty in agreeing termination values.

³ Roadmap for Collateral Management, International Swaps and Derivatives Association, May 2009, New York.

⁴ The Major Broker Dealers are : Bank of America-Merrill Lynch, HSBC Group, Barclays Capital, JP Morgan Chase, BNP Paribas, Morgan Stanley, Citigroup, Credit Suisse, The Royal Bank of Scotland Group, Deutsche Bank AG, Société Générale, Dresdner Kleinwort, UBS AG, Wachovia Bank, N.A, Goldman, Sachs & Co.

⁵ Source: TriOptima estimates as of May 2009. The TriResolve portfolio matching service is used across 1750 legal entities to reconcile approximately 5 million trades regularly, of which 3 million are between the Major Broker Dealers and subject to daily reconciliation. Of the remainder, which are mostly between dealers and other parties, roughly half are reconciled daily and the other half typically weekly. It is estimated that the OTC derivative market size is around 7 million trades in total, based on DTCC and BIS reported data. Thus, overall, 70% of the market is subject to weekly or better reconciliation; 60% of the market is subject to daily reconciliation.

⁶ The Survey was commissioned specially by the ISDA Collateral Committee to support the development of this paper. It should not be confused with the annual ISDA Margin Survey conducted as of December 31 each year. See section 2 of this document for more on the Survey.

Beyond the 60% of OTC derivative market activity that is between the Major Broker Dealers, and thus subject to daily reconciliation, the Survey indicates that the balance of the market activity consists of a significant number of counterparty portfolios which might need to be reconciled. Whilst the total number in the market cannot be quantified, from the Survey it is estimated that some 60,000 portfolios exist between the Major Broker Dealers and other Counterparty Types. These portfolios can be grouped by certain characteristics:

Inactive Portfolios

A significant proportion of these portfolios are not actively traded, and thus the question arises what advantage would be gained by moving to frequent reconciliations for these counterparties? Subject to minimum criteria in terms of trading activity or portfolio size, it is appropriate that such portfolios be excluded from potential future requirements for frequent reconciliation, although it may be appropriate to impose some *de minimus* requirement to ensure both parties still recognize the positions concerned from time to time – for example, by the annual provision of a position and valuation statement by the dealer firm.

Portfolios Subject to Alternate Measures for Integrity Assurance

Portfolio reconciliation between counterparties is not the only method by which portfolio integrity may be assured. In particular, Buy-Side Firms which utilize a range of external services, notably prime brokers, custodians, and exchanges for listed products, have invested in their own technology solutions or use specialised market services which provide assurance of portfolio integrity. Some Buy-Side Firms have also established rigorous trade date “tie-out” regimes which ensure both parties’ records are fully matched. Consequently, many Buy-Side Firms may require limited change to market infrastructure or practice to support the need for portfolio integrity assurance.

Less Frequently Reconciled Active Portfolios

Firms in the Other Banks category tend to perform reconciliations periodically, i.e. weekly or monthly, using a range of technology solutions available to them. For smaller portfolios this may be adequate to ensure portfolio integrity. However, there is currently little to sustain a view that End-Users are uniformly active in portfolio reconciliation, other than for reconciliations (largely manual) performed as part of discovery during informal collateral dispute resolution.

The present time offers a great opportunity to set common standards and adopt a consistent approach across the OTC derivative market that encourages wider use of portfolio reconciliation among OTC derivative users as an effective risk-management and mitigation tool.

We should also note the probable impact of the move towards central clearing for standardized forms of OTC derivative contract. As this trend accelerates over the coming months, and particularly where conversion of existing bilateral trades to a clearing environment takes place, the overall need for portfolio integrity assurance will change. For cleared trades, although the clearing member and their customers will likely maintain their own records of portfolio positions, the clearing house record will be definitive. Remaining bilateral, non-cleared trades between parties will of course still need to be reconciled or subjected to other measures as described above to assure portfolio integrity, but their number will be considerably fewer.

For these remaining bilateral trades, from an implementation perspective the current differences in approach to portfolio integrity will not support a wider market rollout of daily, “Fed 15 style” portfolio reconciliation in a sustainable, scaleable way. Current obstacles include lack of standardisation and proliferation of technology solutions giving different results and embodying different processes; these differences will need to be addressed. There are also issues around security of data transmission, and the current lack of transparency which inhibits an effective and timely break resolution process. The factors involved have been summarised in Section 5 which sets out the Key Findings from this Study.

This Study has validated that industry-wide frequent portfolio reconciliation may not be appropriate in all situations; further, where it is the best solution to portfolio integrity assurance there are many

implementation challenges with significant barriers to overcome. Whilst the scope of this Study is to discuss dependencies and not to decide the eventual outcome, recommendations and potential options from an implementation perspective are set out in Sections 6 and 7. In summary, the key recommendations are that:

- OTC derivative market participants should adopt both the Collateralised Portfolio Reconciliation Best Practices and the Minimum Market Standards for Collateralised Portfolio Reconciliation due to be published by ISDA at the end of 2009.
- The market should develop specific portfolio reconciliation guidelines for participants, differentiating between actively traded portfolios, less actively traded portfolios and small size portfolios where there is infrequent trading activity.

These recommendations, discussed in more detail in Section 6, aim to encourage industry discussion and engagement from a broad range of participants in the next stage of defining an implementation path. Undoubtedly, the key will be to adopt a phased approach and to find a range of flexible solutions that meet the requirements of the majority, yet offer transparency and scalability.

1 Terms of Reference

1.1 Introduction and Background

On June 2, 2009, the ISDA Collateral Committee published a Roadmap of industry initiatives and planned improvements to June 2010 (the "Roadmap"). The Roadmap contains a commitment to regulators to undertake a feasibility study to examine dependencies for wider rollout of collateralised portfolio reconciliations to the OTC market.

Whilst portfolio reconciliation is clearly a subject of interest in the OTC market, take-up throughout the industry is still generally at an emerging stage. The level of engagement on this topic has been encouraging and productive.

In addition to this Study, the industry is addressing this challenge through the following:

- Publication of the Collateralised Portfolio Reconciliation Best Operational Practices due by the end of this year.
- Data quality standards, entitled 'Minimum Market Standards for Collateralized Portfolio Reconciliation' due by December 31, 2009.

When the above work is published, Dealers working alongside non-dealers and Buy-Side firms will be better positioned, as a next step, to recommend a portfolio reconciliation implementation roadmap for 2010 and to have gauged the industry's interest and appetite for implementing new measures. To this end, Buy-Side and sell-side firms will work collaboratively and with vendors to identify solutions to support a wider rollout of portfolio reconciliation during 2010.

1.2 Scope

1.2.1 Definition: Collateralised Portfolio Reconciliations

The objective of collateralised portfolio reconciliation is to ensure that two organisations have one consistent record for a defined portfolio (or group of portfolios) by matching and comparing the portfolio contents provided by each participant based on a description of key economic attributes of the underlying trades. The matching process uses a minimum set of fields necessary to ensure that trades can be accurately matched and incorporates the mark-to-market value the parties assign to each trade.

The process is used on a proactive basis for ensuring that portfolio populations and mark-to-market values (subject to bi-lateral tolerances) remain in line. On a reactive basis, collateralised portfolio reconciliation is used in the process of discovery when a call dispute occurs and one party is unable to agree a calculation of Exposure received from the other party to the agreement.

Collateralised portfolio reconciliation does not provide legal confirmation of individual trades, nor does it seek to revalidate the confirmation process on an ongoing basis. Additionally, the process does not extend to reconciling cashflows or trade lifecycle events (e.g. rate resets, credit events, market disruption events), although the trade linkages created by regular and robust portfolio reconciliation can help to identify if booking discrepancies arise from such events.

The collateralised portfolio reconciliation process should be seen as distinct from other reconciliation functions performed, for example, by Buy-Side firms which reconcile a greater range of fields across OTC and non-OTC products to a variety of sources and for different internal validation purposes.

1.3 Product Coverage

The scope of this Study is limited to issues under the remit of the ISDA Collateral Committee and therefore focusses on collateralised portfolio reconciliation for OTC derivative products documented under an ISDA Master Agreement and any previous version of this agreement

published by ISDA (“ISDA Terms”) with an associated ISDA Credit Support Annex or Credit Support Deed or any long-form confirmation with collateral terms documented under ISDA Terms.

It is not intended that this project should address any non-collateralised OTC transactions documented under ISDA Terms, or other types of transaction whether collateralised or not governed by EFET, PSA ISMA, GTMA or any other bi-lateral agreement.

1.3.1 Regional Coverage

Specifically, no geographical areas have been excluded, but it is acknowledged that there may be impacts from secrecy laws and disclosure of information rules in certain jurisdictions. Restrictions on cross-border transfer of information may also exist. The considerations involved are outside the remit of the ISDA Collateral Committee and have not therefore been included in this Study. Where such issues arise, these should be referred to appropriate legal counsel for clarification and guidance.

1.3.2 Client Coverage

All counterparty types have been considered within the scope of this Study. These have been grouped under the following generic categories:

Major Broker Dealers	being the 15 broker-dealer firms which are signatories to the Roadmap ⁷
Other Banks	being other regulated global and regional banks and financial institutions authorised to transact OTC derivatives as principal
Buy-Side firms	being all funds, including hedge funds, other market funds, fund managers, asset managers, and other active users of OTC derivatives for investment and trading purposes
End-Users	being all corporates and other OTC derivative end-users

1.4 Objective

The objective of this Feasibility Study is to identify the issues which impact an expansion of regular portfolio reconciliation activity throughout the OTC market.

The Roadmap identified key dependencies to be addressed by this Study:

- **Transparency:** All parties will need to utilise a reconciliation model which enables both sides to view the results and work on any breaks
- **Technology and Inter-operability:** A practical solution is required for those firms using in-house reconciliation tools and those requiring to use different market services. At a minimum, reconciliation results will need to be transparent and accessible by both parties, but service providers must offer functionality which enables recs to take place between users of different services to an agreed quality standard.
- **Data Quality:** Adoption of a MMS (minimum market standard) for data presentation and field formats applicable to all users when presenting portfolios for reconciliation

Since the Roadmap was published, additional issues have arisen as the market moves on in terms of thinking and planning.

Important considerations in this respect are the requirements of ISDA’s Dispute Resolution Procedures which introduces portfolio reconciliation as a mandatory first step and the future impact of central clearing and trade warehouses.

⁷ As of the time of writing there are 15 such dealer firms remaining; in the past there were more and the number may change, up or down, in the future.

The ISDA Portfolio Reconciliation Survey discussed in Section 2 indicates there is a divergence in practice and expectation among active users, although generally there appears to be a comparatively low level of awareness globally about pro-active portfolio reconciliation and consequently a limited level of take-up.

Consequently, the scope of this Study has been expanded from the original dependencies identified in the Roadmap to discuss the impact of these additional factors.

2 ISDA Portfolio Reconciliation Survey

2.1 Survey Scope

To assess current collateralised portfolio reconciliation views and practices in the OTC market the ISDA Collateral Committee commissioned a Survey to assist this Study in identifying dependencies for wider take-up of portfolio reconciliation.

2.1.1 Target Audience, Distribution and Response

The target audience was all types of OTC users in line with recommendations in CRMPG III advocating that the industry should move towards frequent portfolio reconciliations. The Survey was distributed to all members of the ISDA Collateral Committee in early July. 47 responses were received and grouped into 3 categories: Broker Dealers (15 Major Broker Dealers), Global and Regional Banks (Other Banks), and Funds & Asset Managers (Buy-Side). No End-Users including corporates responded to the Survey.

2.1.2 Survey Results

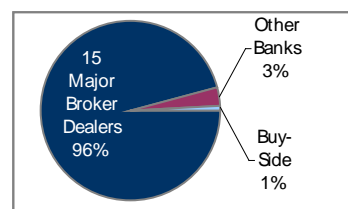
Whilst all Survey respondents indicated that they perform regular portfolio reconciliations for their OTC trade population, there is a large variation in how firms in each category execute this task. The variations are in large part attributable to differences in overall size of their OTC trade populations and differences in the underlying reasons for undertaking a reconciliation.

The average Fed 15 Dealer maintains a collateralised OTC derivative book of 690,800 trades. Respondents in the Other Banks category averaged 23,700 trades. Respondents in the Buy-Side category average 6,950 trades. See Figure 1. below.

Figure 1.

Average Size of OTC Derivative Book

15 Major Broker Dealers	690,800 trades per Dealer
Other Banks	23,700 trades per Bank
Buy-Side	6,950 trades per Buy-Side

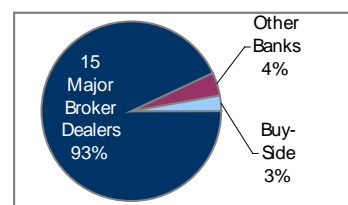


Total numbers of collateralised agreements with live trades were highest for the Major Broker Dealers, averaging 4,360 per dealer. For Other Banks the average was 192 portfolios, and for Buy-Side firms was 127 portfolios. See Figure 2. below.

Figure 2.

Average Number of Collateralised Agreements with Live Trades

15 Major Broker Dealers	4,360 portfolios per Dealer
Other Banks	192 portfolios per Bank
Buy-Side	127 portfolios per Buy-Side



The divergence in portfolio size shows relatively few portfolios over 2,500 trades among respondents; larger portfolios are almost exclusively held by and between the Major Broker Dealers (averaging 23 portfolios/dealer). Portfolios of under 100 trades account for the greatest concentration, with the Major Broker Dealers averaging 3,940 portfolios, Other Banks averaging 135 portfolios, and Buy-Side firms averaging 58 portfolios.

The majority of respondents in each category indicated that the portfolio reconciliation function currently resides in collateral and will do so in the future. However the Survey highlights that how reconciliations are performed, available resource, and prioritisation of break resolution, vary greatly. This may in part be due to the wider scope and uses that, for example, Buy-Side firms attribute to portfolio reconciliation.

For example, 100% of the Major Broker Dealers utilise a vendor solution for portfolio reconciliation, while 71% of Buy-Side firms maintain an in-house reconciliation solution. In the Other Banks category, reconciliation solutions are variously spread across both options.

The Major Broker Dealers staff their reconciliation teams at a rate of approximately 1 FTE per 49,800 trades. Other Banks staff at a rate of approximately 1 FTE per 2,200 trades while Buy-Side Firms staff at a level of 1 FTE per 700 trades. This disparity in resourcing, taking into account that Buy-Side firms may cover reconciliations with Custodians, Prime Brokers, etc and include other non-OTC products, manifests itself in the types of breaks being worked on and expectations between the different user groups for break resolution turn-around times. The relatively higher apparent efficiency of the Major Broker Dealers likely reflects economies of scale and the benefits of strong investment in this space over the past few years.

Buy-Side firms tend to approach the task of portfolio reconciliation more broadly, prioritising break resolution activities for collateralised and non-collateralised trades across MTM, trade population and trade economics but reconciling trades within a single portfolio. The Major Broker Dealers and Other Banks prioritise mainly MTM and trade population breaks limited to their collateralised trade population. However, they largely reconcile across multiple legal entities, whilst leaving the trade economic validation effort to the trade confirmation teams located outside of collateral.

All responding firms generally expect to reconcile portfolios and identify trade breaks on T+1. However, Buy-Side firms look to resolve breaks within 24 hours of break identification, whilst the Major Broker Dealers and Other Banks given the larger number of portfolio involved expect resolution to occur by T+3.

The majority of respondents in all categories indicated a willingness to implement best practice as it relates to reconciliation data standards and share responsibility for break resolution in a proactive reconciliation. The expected timetable for firms to meet these standards differs, with Buy-Side firms expecting to comply within 3-6 months, and the Major Broker Dealers and Other Banks anticipating that IT system changes could take up to a year owing to the scale of the changes, although it is anticipated that these timeframes could be reduced. It should be noted that these are averages and speculative based on expected content of best practice documents that are yet to be completely drafted and published; they should not be understood to commit any firm or firms.

3 Interpreting Survey Results

3.1 Challenges and Additional Issues

The Survey results highlight a number of challenges which the OTC community will need to address in achieving broader market roll-out:

- **Multiple Reconciliation Solutions:** While the Major Broker Dealers use a vendor-serviced technology solution for reconciliation between themselves, Other Banks and Buy-Side firms utilise many different solutions. Different vendor and in-house solutions maintain different trade matching algorithms and data sets. This circumstance can yield significantly different match results from the same set of data.
- **Different Reconciliation Models:** Some firms utilise a bi-lateral model where the full reconciliation results are shared by both parties. Others utilise a unilateral model where one party sends their portfolio to the other which then performs a reconciliation using their vendor or in-house solution. The reconciling party determines the level of match information to share with the sending party. In yet another model, both parties exchange data files and each performs a reconciliation using their preferred reconciliation technology.

- **Competing Break Resolution Priorities:** Multiple solutions and different models result in parties establishing different priorities with respect to break resolution. In the unilateral model, breaks take longer to resolve because parties view different match results and in many cases query different and possibly invalid issues.
- **Inconsistent Expectations:** A combination of the above, taking into account differences in portfolio size and complexity for firms within each of the 3 responding categories, results in a very different set of expectations on turn-around time for break resolution. This leads to mistrust and increased frustration on the part of reconciliation staff.
- **Transparency:** There remains a residual lack of commitment to providing transparency over full reconciliation results, although major steps forward in perception have recently taken place. This has been an area of sensitivity in the market for a number of years where selective break identification has been the normal practice.
- **Portfolio Demographics:** Taken in the context of wider market rollout, the significant difference in size of portfolios and number of counterparties which exists across counterparty groups poses a considerable resource and workflow challenge for the Major Broker Dealers in particular.
- **Reconciliation Frequency:** Whilst the Major Broker Dealers are able to perform daily reconciliations between themselves via an automated solution, the majority of counterparties undertake weekly reconciliations or ad-hoc (ie dispute-driven) portfolio reconciliations.
- **Data Standards Implementation:** Potential requirement for extended timeframes for the Major Broker Dealers and Other Banks to effect IT system changes to comply with Market Minimum Standard recommendations.
- **Resourcing:** Achieving a higher level of daily reconciliations and a greater degree of market take-up will undoubtedly pose resource challenges particularly to the Major Broker Dealers and Other Banks. The resource pool of trained staff in this respect is currently limited.

4 Discussion of Market Issues

4.1 Reconciliation Technology

4.1.1 Technology Options

Technology options available for performing portfolio reconciliations fall into two main categories, ie vendor-serviced and in-house solutions.

The vendor-serviced area is expanding with more offerings coming to market and under development. In the main, these are hosted solutions, where subscribers submit files or upload to the vendor. The vendor then undertakes the reconciliation and publishes results to the subscriber(s). Of vendors active in this area, there are different service models, degrees of automation, levels of control and transparency.

An alternative vendor reconciliation solution exists in a number of collateral management systems built by vendors and purchased for in-house use by clients. This vendor-supplied solution sits mid-way between hosted vendor services and fully in-house solutions. The portfolio reconciliation capability is designed by the vendor, whilst the operation of the system and reporting of results are carried out unilaterally in-house by the client.

Full in-house models are bespoke solutions developed by firms internally to reconcile trade positions across a range of traded products, including non-collateralised trades and non-OTC (eg Repo) transactions. Development of these models is primarily to meet a different business need which is wider than the scope of this Study. These are proprietary models for internal use and in the main were not designed to provide visibility over matching controls or provide bi-lateral access to results reporting.

The final option is using spreadsheets or databases to reconcile trades manually. In terms of numbers of counterparties, this is probably the most widely used method in the OTC industry at present, although typically for smaller portfolios. The reconciliation is carried out by one party in-house. It is mainly used on an ad-hoc basis to investigate reasons behind collateral call disputes. It is time and resource intensive and open to human error.

4.1.2 Multiple Reconciliation Solutions

The variety of solutions being utilised in itself presents a challenge for moving forward towards full market adoption. Whilst many counterparties are agnostic to adopting one or another type of solution, those counterparties which have developed in-house systems – often at great cost – or purchased vendor-supplied systems are naturally less open to change.

Portfolio reconciliation activities in the market until recently have generally been informal and carried out internally by firms for their own purposes. As a result, the solutions used – whether vendor or in-house developed - are not based on the same reconciliation model. Different solutions maintain different trade matching algorithms and data sets, and significantly different match results can be returned from the same set of data.

Reconciling OTC portfolios and matching up trades accurately is not an easy process. Unlike other traded products (eg repos) which are straightforward standard types of transaction, OTC derivatives take a variety of shapes and forms, both complex and vanilla and embrace a range of underlying instruments, principally rates, equities, credit, commodities and FX.

Accurate trade matching, adequate controls (eg manual matching of trades), consistency of data, are subjects that have been investigated in some depth over many years by the Major Broker Dealers, Buy-Side firms and other groups. Root cause analysis to identify non-economic reasons for breaks and unmatched trades is still being worked on today and indicates that the reconciliation process is not fully mature. The underlying issues are mainly due to the complexity of the product being reconciled and serve to explain how different reconciliation results can be obtained from the same set of data.

The proliferation of solutions will almost certainly result in a 'rec the rec' situation as more counterparties start to reconcile with each other. In this context, multiple solutions will reduce the value of the reconciliations themselves to the lowest common denominator – i.e. one party matches 95% of the trade population but the counterparty using a different solution matches 70% - therefore the confidence level in the reconciliation results is reduced to the lower of the two.

Whilst the Major Broker Dealers in using a single vendor service can provide consistent results between themselves, roll out of portfolio reconciliation to all OTC users highlights the challenge of conforming results across a range of different solutions.

4.1.3 Different Reconciliation Models

Principally these are :

- unilateral models where one firm performs the reconciliation and selects results for its counterparty to investigate.
- bi-lateral models where parties deliver their files to a vendor-service which performs the reconciliation and publishes the results. Results are generally published to subscribers but non-subscribers can be given read-only access for review.

Variations of both models exist, for example where both parties exchange data files and each performs a reconciliation in-house.

Vendor services offer varying degrees of the unilateral / bilateral model mix. There is the fully bi-lateral model where the vendor service applies the same matching rules to all reconciliations and results are fully consistent for all recs performed.

In hybrid vendor models, the vendor allows some flexibility to subscribers to unilaterally determine elements of matching criteria and/or tolerances. In a fully unilateral vendor model, one party elects the matching rules and controls the process.

4.1.4 Inter-Operability

Inter-operability has long been an efficiency goal pursued in the OTC market. It envisions streamlined automated processing by vendors of OTC derivative lifecycle events with automated transfer of data from one vendor to another, irrespective of whether the other vendor provides complementary or competing lifecycle services.

Inter-operability within the scope of this Study looks at the ability of any vendor or in-house solution to take in data files for reconciliation from a number of external sources, and to provide files to any external provider or party for reconciliation outside their own solution. Transparency would need to be provided for both parties with results transmitted back to source and, in the case of vendor solutions, normalised for client review within their usual workflow process.

Aggregating and conforming results from different reconciliations of the same data becomes the key issue given the probability that a 'rec the rec' situation will develop. This leads to the question of which reconciliation results will provide a definitive record if the parties are not to be severely delayed in pursuing the genuine break resolution process.

Currently solutions for inter-operability do not exist. Discussions with vendors across competing offerings on their proposals have largely drawn a blank. Feedback is that vendors are looking for detailed requirements from the market about the model to be pursued. This is a highly proprietary area between vendors, and sensitivity over their matching algorithms and service offerings is understandable.

4.2 Data Quality

Results from the Survey highlight data quality as the top issue of concern in the portfolio reconciliation process. Commodities and equities are identified as the products which firms find hardest to reconcile.

These views are not without foundation, and consistency of data underpins the effectiveness of the entire collateralised portfolio reconciliation process. Where firms do not provide sufficient data, or cannot provide data to an adequate standard, or are unable to provide data in a normalised format, then the process of matching up trades becomes manual, haphazard and prone to error.

Any benefits of undertaking portfolio reconciliation are largely lost in what becomes a resource intensive and time consuming process of manually matching trades. Such reconciliations are rarely completed or revisited on a regular basis.

There are a number of factors at play which underpin data quality:

- Trade classification and how trades of different OTC product classes are described
- Minimum set of data fields used to describe those products to facilitate accurate matching
- Content of those fields
- Field formats
- Timing of when trades should come in and out of the portfolio
- Treatment of lifecycle events, fees, pending settlements, fails, etc

- Availability of counterparty trade IDs, common market IDs (for example from confirmation engines) and 'gold record' warehouse IDs.

Data quality standards, entitled Market Minimum Standards for Collateralised Portfolio Reconciliation, are being developed by wide consensus and market engagement under the auspices of the ISDA Collateral Committee and will be published by the end of this year.

The MMS address collateralised portfolio reconciliation as defined in Section 1 to support the goal of accurate trade matching. The aim is to achieve one consistent record for a defined bi-lateral portfolio (or group of portfolios) of OTC derivatives trades. When data is presented in a consistent form, the matching process can take place in the most effective and automated manner possible.

Undoubtedly, discrepancies will show up as part of any matching process. These may be true breaks or may be non-economic breaks, for example trade representation, matching logic or IT issues. When portfolios are reconciled proactively and regularly, these issues, which are often recurring themes, can be identified and investigated.

In addition the ISDA Collateral Committee, as part of the Roadmap, is developing Collateral Management Best Practices which are integral to the collateral call process. As a guiding principle, counterparty portfolios underlying the exposure calculation and collateral call should be consistent with the portfolio presented for reconciliation. The Collateral Management Best Practices, which are due for publication by June 2010, will additionally support a consistent approach across the industry.

Publication of these documents will be an important step in developing more cohesive processes and in providing guidance for all users of the OTC market.

4.3 Portfolio Demographics

The Survey highlighted significant variations in portfolio size and distribution between responding groups, summarised in the following table:

Average number of collateralised agreements with live trades per counterparty with portfolios sizes:-	Major Broker Dealers	Other Banks	Buy-Side Firms
More than 2,500 trades	59	2	0.50
Between 500 and 2,500 trades	36	16	62.5
Between 100 and 500 trades	284	39	6
Less than 100 trades	3,936	135	58
Average total number of collateralised agreements with live trades per counterparty	4,362	192	127

Portfolios greater than 2,500 trades are mainly held between the Major Broker Dealers. These inter-dealer portfolios average only 1% of their total number of collateralised agreements although the trade volume held in these portfolios is estimated to account for around 60% of market volume. Between the Major Broker Dealers all portfolios over 500 trades are reconciled daily.

Over 100 trades, numbers of portfolios starts to increase. With a phased rollout of portfolio reconciliation, the counterparty numbers are supportable with appropriate standards in place for presentation of data, reconciliation technology and process consistency.

The greatest concentration of counterparties for potential reconciliation arises in portfolios under 100 trades. Whilst trade volume in this part of the collateralised population is small, numbers of counterparties involved is significantly high.

Generally, where portfolios are largely static in population, it is unlikely that daily reconciliation would be an appropriate solution. Substantial stress on current market infrastructure and resourcing would be imposed by seeking to reconcile every portfolio every day and, without active trading taking place, with little added value.

4.4 ISDA Dispute Resolution Procedures

The terms of the Dispute Resolution Procedures (“DR Procedures”), under Standard Timings, requires invoking parties to reconcile trade portfolios on the day that a dispute occurs and to complete investigations by the following business day.

There are a number of considerations which pose challenges for the general market and in particular for OTC participants not already using collateralised portfolio reconciliation on a proactive basis:

- Providing a portfolio of trades from internal systems on demand
- Normalising format of portfolios, how trades are represented and described
- Transmission via secure means, potential for breaches of sensitive data
- Choice of technology to implement the reconciliation
- Form of results and communication to the counterparty
- Transparency of trade matching
- Potential for parties to disagree reconciliation results and therefore population of “Transactions under Investigation”
- Unknown volume of disputes subject to DR Procedures and whether non-automated technology can support
- Ability to meet the timelines of the process if any of the above fail

Whilst the challenges in performing these reconciliations are the same, the tight operating timelines of the DR Procedures bring into sharp focus that there is an urgent need for efficient market-wide solutions to be introduced or developed.

4.5 Future Market Developments

A number of changes in OTC market infrastructure will impact portfolio reconciliation activities:

- Advent of central counterparties for clearing of OTC derivatives
- Build-out of ‘gold record’ capability for major OTC product classes (other than Credit derivatives which already exists)
- New OTC trade Repositories for regulatory reporting of Interest Rate and Equity derivatives in addition to Credit derivatives
- Further automation in the OTC confirmation process with expanding availability of common trade IDs assigned by confirmation engines

Undoubtedly the advent of central counterparty clearing for OTCs will over time reduce the volume of trades in the market to be reconciled. Although standard OTC products will move to clearing, the nature of the OTC market suggests that there will remain a proportion of transactions - new

trade types and bespoke structured trades - which do not lend themselves to standardisation or conform to eligibility criteria.

Definitive "gold record" trades provide an opportunity to leverage data for portfolio reconciliation purposes since, by definition, these trades should not have to be re-reconciled daily. The ability to amalgamate a trade feed from the source utility and attach daily MTMs will improve speed and accuracy in the portfolio matching process.

Speed and accuracy are also supported by the market expansion in electronic confirmation/affirmation capabilities. Common trade IDs assigned during the confirmation process can and should be captured and used to identify matching trades for portfolio reconciliation (Best Practices).

5 Key Findings

5.1 Reconciliation Technology

The proliferation of technology which is used to perform reconciliations is one of two fundamental dependencies to be addressed. At a high level, there are two basic options:

- all participants use one technology solution
- all participants use different technology solutions but those solutions are inter-operable and perform on a consistent basis to provide consistent results

Looking to current models, it is clear that there are applications (particularly in-house solutions) which were built for different and wider purposes. Many Buy-Side firms have designed technology for wider uses than collateralised portfolio reconciliation. Whilst the breadth of these models is outside the scope of this Study, such broader use would be a natural development of reconciliation activities in the future.

Key Finding:

The immediate solution must be scalable, i.e. able to deal efficiently with increasing volumes, and will need to provide transparency over reconciliation results for both parties. Use of automated tools and secure transmission methods will be needed to support rollout in a high volume environment and will serve to improve overall control and security of the process.

5.2 Common Data Standards & Consistency

The second fundamental dependency is data standards; that is, how trades are represented in the portfolio, the fields used to accurately match trades, and the field content and format. Whilst different matching models can produce different results, unless trades can be presented in a standardised, consistent manner by all parties, portfolios cannot be reconciled accurately or in any automated fashion. Parties will be thrown back to manual investigation and exchange of trade confirmations or other evidence in order to pair up trades. The delays caused are significant and the process is highly resource intensive.

Key Finding:

The Market Minimum Standards for Collateralised Portfolio Reconciliation ("MMS") being developed under the auspices of the ISDA Collateral Committee will be published by the end of 2009. These market-agreed minimum field requirements for collateralised OTC reconciliations should be viewed as entry-level criteria for wider market rollout.

5.3 Scalability

Wider adoption of portfolio reconciliation raises the issue of scalability and whether current technology can support a substantial increase in the reconciliation activity involved. There will be a need for vendors in particular to have solutions in place which can manage a significant uplift in files to be reconciled daily.

Key Finding:

Ultimately, unless the reconciliation process becomes more automated than is currently the case – via FTP uploads or similar – it will remain largely manual in nature and un-scalable for most counterparties to process.

5.4 Transparency

Transparency over full reconciliation results has in the past been an area of sensitivity in the market, although responses to the Survey suggest that most participants would now share results with counterparties. Certainly this is a welcome development but there remains some residual resistance particularly in the Other Banks category where 31% said they would not be prepared to share full results.

Clearly, lack of transparency would be an impediment to market rollout if confidence in the integrity and value of the process is undermined by lack of visibility about what results have been obtained. Market vendor services are able to provide transparency and should be encouraged to do so. Unilateral in-house technology solutions provide a more challenging question in terms of what information will be delivered.

Transparency requirements should also extend to how the reconciliation is performed. Matching rules and control criteria should at least be clear if not under the control of both parties.

Key Finding:

The guiding principle should be that no one party should have full control over a reconciliation process which matches bi-lateral records for any formal purpose. Examples would be reconciliations performed for Dispute Resolution or regulatory reporting. Outside of formal purposes, any form of unilateral reconciliation should create an accountability of that party to its counterpart for accuracy of matching methodology and for full transparency of results.

5.5 Inter-Operability

The stand-alone nature of current technology solutions does not assist wider market rollout of portfolio reconciliation. As discussed, many technology solutions are specialised and designed for different purposes, and the results from those reconciliations can be different for the same data set. To maintain market choice, the difficult question of inter-operability needs to be resolved. Many firms have built internal workflow tools supporting their reconciliation process, for internal distribution of results, and for break resolution and reporting. Subscribing to multiple vendor platforms would be a costly and inefficient outcome given the volumes involved.

Key Finding:

Opportunities offered by market developments open up the potential to re-imagine requirements for inter-operability as linkages between reconciliation platforms, trade warehouses, and confirmation matching engines. Portfolio reconciliation for the Collateral function should move to a core requirement for matching trade populations and comparing of MTM valuations on those trades.

5.6 Reconciliation Frequency

The Survey shows that daily reconciliations are mainly undertaken between the Major Broker Dealers and by Buy-Side firms who reconcile 57% of their total collateralised portfolio trade volume daily. Other Banks report 2% daily reconciliation activity.

Weekly and monthly reconciliations average 45% for Other Banks, 42% for Buy-Side firms and 14% for the Major Broker Dealers.

Reactive dispute-driven reconciliations are most common in the Other Banks category averaging 53% of their total collateralised portfolios, whereas this reduces to 24% for the Major Broker Dealers and 1% for Buy-Side firms.

Reconciliation policies are largely driven by firm's internal approaches to risk, what value they place on the reconciliation process, and whether suitable technology and resources are available to meet requirements. Where portfolios are not actively traded, there would appear to be less justification to undertake daily collateralised reconciliations.

Key Finding:

A general approach for all counterparties might be that, if trading is significant then proactive portfolio reconciliations should be in place. For portfolios with trading activity which is periodic, then reconciliation could take place in line with this. However, for portfolios under 100 trades, reconciliation of a less formal nature may be the practical and more appropriate solution.

5.7 Bi-Lateral Commitment & Shared Responsibility

The current fragmented process and multiple technology solutions have resulted in parties establishing different priorities around reconciliation and break resolution timeframes which is highlighted in the Survey. Additional factors of differences in portfolio size and resourcing also result in different expectations between counterparty groups. Where unilateral models exist, breaks can take longer to resolve as parties are viewing match results and working on breaks in different places.

Recent market discussions have developed the concept of bi-lateral commitment to reconcile to one of 'shared responsibility' by the parties. Irrespective of which party performs the reconciliation, both parties have a responsibility to work together co-operatively, to share results and information, to protect the integrity of the process and therefore the integrity of the reconciliations being performed.

Key Finding:

In order to be effective the reconciliation process depends on both parties working together at the same time and with similar levels of priority. Best Operational Practices for Collateralised Portfolio Reconciliation will be published by the ISDA Collateral Committee in December this year and will help to address underlying issues through a more consistent approach across the market.

5.8 Resourcing

From the Survey, an issue of concern to respondents is availability of resourcing to undertake the reconciliation function. The impact of wider market rollout and of the Dispute Resolution Procedures will undoubtedly place strains on existing staffing levels. With a limited pool of expertise in this area, new personnel will require extended training to perform the role.

Key Finding:

The impact on resourcing can be mitigated by focus on automating technology, reducing points of contact for data transfer across the market, and applying consistent standards between participants. This will mitigate time unnecessarily spent on manual processing and administration wherever this can be avoided.

5.9 ISDA Dispute Resolution Procedures

Whilst this Study focusses on dependencies for proactive daily reconciliation, the requirements of the DR Procedures will need to be supported in the immediate plan. Requirements may not be clear until 2010 when implementation of the pilot is completed. Some factors can however be foreseen, the most important of which are (a) parties providing data which does not meet MMS requirements and (b) that reconciliation results themselves may be disputed.

Key Finding:

Many technology solutions currently in use are not inter-operable, or compatible with yielding consistent results or standards of transparency. The outcome will cause delays whilst parties attempt to address their data issues on a case by case basis. Given the timeframes involved, this is an area which needs urgently to be addressed.

5.10 Future Market Developments

In general, wherever validated information is held in central market sources, and wherever common market IDs are assigned to individual trades, the portfolio reconciliation process can leverage this data for greater efficiency. The ability to use new sources, for example Repositories, will depend on what trade information is captured and stored. Maximum leverage could be gained for the OTC market by co-ordinating across functional areas to define potential uses, requirements and to achieve common goals.

The move to central clearing and extension of warehouse capabilities - combined with the best practice of exchanging internal trade identifiers during confirmation – opens up the possibility that a majority of trades will not have to be re-matched daily.

Key Finding:

Ultimately, central clearing solutions are expected to minimise the population of trades to be reconciled for collateral purposes and shift the reconciliation focus from bi-lateral to dealer to CCP and buy side to clearing member.

6 Conclusions and Recommendations

The underlying premise of this Study has been to promote the goal of portfolio integrity in the OTC market, as contemplated by CRMPG III, through wider adoption of the collateralised portfolio reconciliation process. Other influences will have an impact in designing an appropriate response, in particular :

- Reduced volume of trade populations to be reconciled as a result of the introduction of new market CCPs and 'gold record' trade warehouses
- Issues arising from implementation of the Dispute Resolution Procedures. Impacts are to be assessed from the results of the pilot and test phase concluding in June 2010.

Looking to areas in which this Study can put forward recommendations for achieving wider market adoption of collateralised portfolio reconciliation, these are as follows:

Recommendation 1

OTC derivative market participants should adopt the Collateralised Portfolio Reconciliation Best Practices (to be published December 31, 2009).

Recommendation 2

OTC derivative market participants should adopt the Minimum Market Standards for Collateralised Portfolio Reconciliation (to be published December 31, 2009).

Recommendation 3

ISDA should commission an Implementation Plan to develop a graduated approach to wider market adoption of Portfolio Integrity Assurance measures. It is recommended that the plan should be developed by February 28, 2010 and should address:

- **Adoption of a regular portfolio reconciliation discipline for actively traded portfolios with counterparties trading OTC derivatives as principal, for hedging and for investment purposes. This is principally directed to the Major Broker Dealers⁸, Other Banks and Buy-Side firms.**
- **Adoption of a periodic portfolio reconciliation discipline for counterparties with less actively traded portfolios, principally directed to End-Users.**
- **Exclusion of small size portfolios where there is infrequent trading activity from the requirements of formal portfolio reconciliation. This is principally directed towards End-Users. For these portfolios, annual provision of a position and valuation statement by the dealer firm, which enables the counterparty to verify the portfolio population may be a more appropriate approach.**

⁸ Portfolios between the Major Broker Dealers are already subject to daily portfolio reconciliation. This recommendation is focused on portfolios between derivative dealers (Fed 15 Dealer and Other Banks) and Buy-Side firms, where stronger harmonization of market practice and reconciliation frequency may be helpful. It is unlikely that portfolio reconciliations between these classes of entities should be as frequent as the daily standard in place for the large, complex, high volume portfolios between the Major Broker Dealers, but the recommended Implementation Plan would identify specifics.

7 Potential Models for Reconciliation Solutions

To an extent, different market requirements will need to come together for the common good. Whether that should happen through promoting inter-operability, whether inter-operability is a feasible goal, or whether a more centralised approach to reconciliation activity should be taken for the future, are subjects for wider market views. In that context, the final section of this Study suggests options for potential market models. It is hoped that these may encourage discussion within the industry and assist in defining an agreed solution.

The options put forward in this Section illustrate a range of potential models for further discussion. The goal for the industry will be to develop an optimum market model to support a daily reconciliation strategy. Whilst such a reconciliation strategy may not be appropriate for all counterparty groups, nevertheless the volume of reconciliations to be performed both proactively and pursuant to the DR Procedures on a regular basis is expected to be high.

New counterparties will be onboarded with limited experience in proactive reconciliations and/or delivering portfolio statements. There should be a clear, accessible data and process infrastructure in place to enable a wider adoption which works effectively.

The Key Findings set out in Section 5 of this Study are presented to guide market discussion on future direction and requirements, and should be considered in designing a solution. To the extent that all requirements cannot be delivered in the earliest stages, there should be a clear view of how these might be achieved in the future.

7.1 Shared Responsibility - Choose your own reconciliation solution

Features

Mix of unilateral/bi-lateral reconciliations with full transparency of results based upon predetermined bi-lateral conversations between counterparties to agree the reconciliation parameters. Parties to adopt Portfolio Reconciliation Best Practices and MMS data standards published by ISDA.

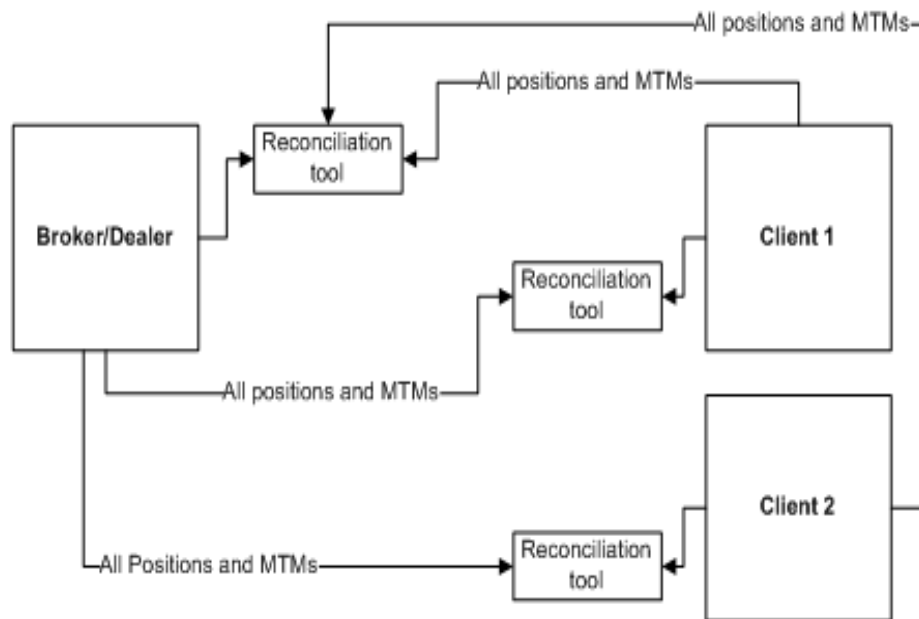
No requirement on both parties to perform the reconciliation or to reconcile on a single platform. However, both parties share responsibility for output and integrity of the process.

Positive

- Leverages current unilateral reconciliations broadly utilised by Buy-Side firms.
- Different methods currently work well for different categories. The Major Broker Dealers using single bi-lateral solution, Buy-Side firms using specialised technology which is generally unilateral.
- Provides flexibility for market participants to drive decisions specific to portfolio reconciliations relative to their view of their portfolio risk against specific counterparties.
- Together with adoption of Best Practices and MMS data standards, meets many baseline requirements.

Challenges

- Scalability due to significant number of bi-lateral conversations that must occur; high number of 'touch points'
- Resource intensive through managing different processes
- Quality and results of the reconciliations can vary between market participants if both choose to unilaterally reconcile
- Some solutions may not utilise electronically confirmed or 'gold' data
- Increasing population of bespoke reports



7.2 Centralised Data Model - Use your own reconciliation solution

Features

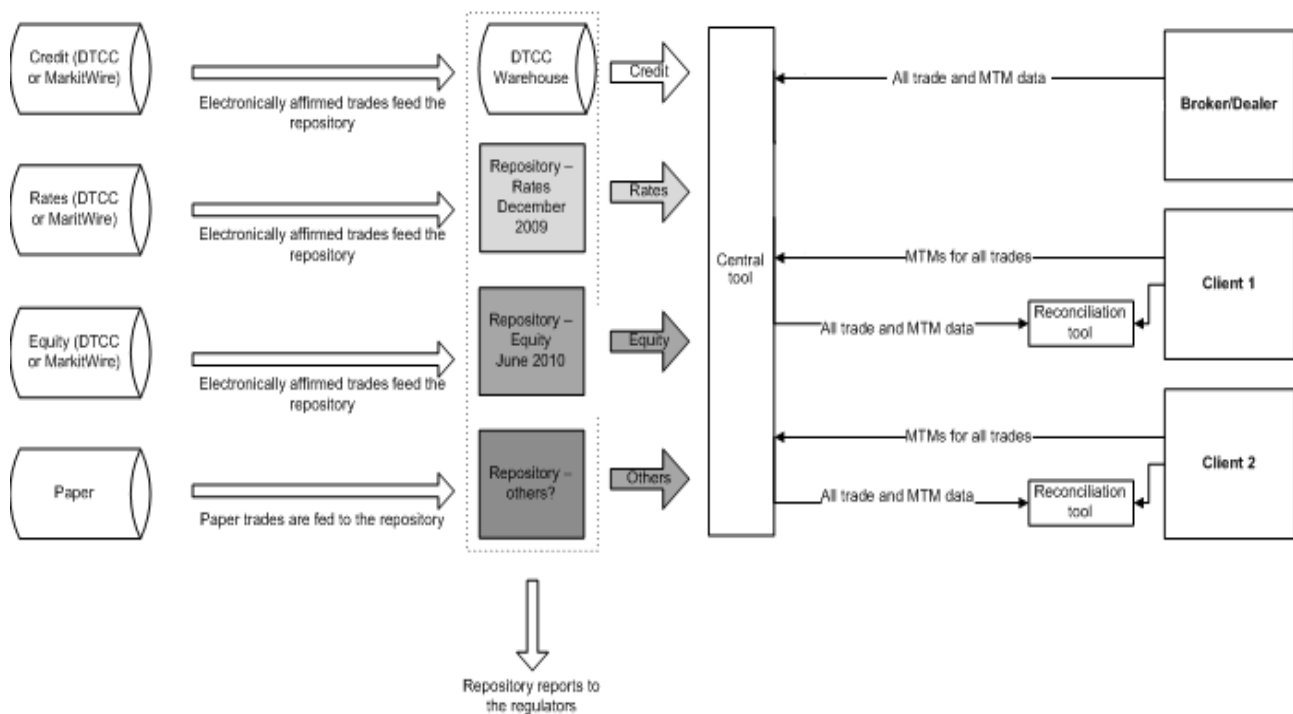
Use central platform as single point of contact, aggregation of data from market sources, but maintain own technology solution for performing reconciliations. Platform to impose data standards (MMS). Market to adopt Best Practices.

Positive

- Preserves the ability of market participants to choose their own reconciliation solution
- Improved security via FTP uploads/downloads from central vendor
- Single touch point: can impose minimum data standards and bi-lateral commitment to reconcile
- Leverages interoperability: aggregation of data from 'gold' sources and confirmation engines; reduced likelihood of 'rec the rec' situation
- Data for different rec requirements (eg position recs) can be made available

Challenges

- Reduced efficiency if parties are using different reconciliation tools as both parties will investigate the breaks from different systems
- The quality of the reconciliation can vary between market participants
- Results are not automatically shared, limited transparency.
- Limited scalability depending on chosen technology.



7.3 Centralised Data Model: Single Collateral Portfolio Reconciliation Vendor

Features

Use central vendor for aggregation of data from market sources plus for performing collateral reconciliations for formal purposes (regulatory commitments, Dispute Resolution Procedures, regulatory reporting)

Positive

- Security is improved and the model scales well as all parties provide collateral data to the central vendor and obtain from it in a secure manner
- Leverages Interoperability with Trade Warehouses and confirmation matching engines as the central vendor would provide reconciled data combined with 'gold record' matching from other industry sources.
- Increased efficiency for all parties, one definitive collateral rec per bi-lateral relationship, eliminates 'rec the rec' situation
- Transparent, breaks visible to both parties, only one record to work on
- Central reconciliation assists new entrants to onboard

Challenges

- Least flexible as it eliminates ability of market participants to choose their own collateral portfolio reconciliation solution while creating a central industry source for the aggregation and distribution of collateral data
- Many market participants already have reconciliation solutions which they need to maintain for their wider purposes

