Global Inventory Management

The Central Nervous System of Financial Institutions in the New Collateral Ecosystem
Global Inventory Management has become critical to both buy side and sell side firms transacting in collateralized business lines in recent years.

This paper:

- Maps the new more integrated, automated and industrialized collateral ecosystem
- Shows how at the firm level, Global Inventory Management technology acts as the central control function of this new paradigm, with a more integrated market infrastructure as the nervous system
- Proposes that the industry is moving from an environment of individual competing firms to extended value chains of networked organizations
- Demonstrates how centralization of data allows a holistic focus on deployment of scarce resources such as capital, balance sheet and liquidity
- Discusses future technology trends that will enable collateralized trading to become leaner and more efficient, while addressing systemic vulnerabilities through a more robust and flexible architecture.
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Regulatory Reporting, MIS, Risk Reporting, Client Reporting

Basel III Leverage Ratio (Balance Sheet Management), Net Stable Funding Ratio, Liquidity Coverage Ratio

Pre and Post Trade Analytics

Regulatory Requirements

Collateralized Silos, Sources and Sinks

Synthetic financing, Cleared/Bilateral OTC & Exchange Traded Derivatives, Repo (Bilateral/TriParty), Central Banks, Securities Lending (Bilateral/TriParty)

Collateralized Business

Third party Systems and Data Feeds


Transaction Inventory and Market Data Feeds

EXTERIOR MARKET

Reconciliation Solutions, Messaging, SWIFT, Initial Margin calculation utilities, Blockchain (?)

Market Infrastructure/Service Providers

TriParty Agents, Trade Repositories, CCPs (derivatives, cash equity, securities lending & repo), Custodians, Central Banks, (i)CSDs, Electronic Trading Platforms, Peer to Peer Networks

Market Utilities
Toward a More Interoperable Market Infrastructure

The diagram on the preceding page maps out one view of how the new more integrated ecosystem could look. In conjunction with the evolution of technology and processes at the firm level, a series of industry-wide initiatives are currently in flight. These initiatives aim to create a more joined up infrastructure for moving collateral around across geographic locations and pools.

Fundamental to this more efficient plumbing is greater integration and interoperability between (i)CSDs, Custodians and Tri-Party agents and market utilities.

This sees a more integrated collateral ecosystem with greater interoperability between market infrastructure and more connectivity between different systems, data providers and trading platforms. This in turn allows an increase in automation and straight through processing.

The network and efficiency effects of these more integrated channels will ultimately result in a collateral ecosystem that is more resilient to economic shocks, leading to a reduction in systemic risk.

A Future Vision of the 21st Century Collateral Ecosystem

This paper firstly maps out this new 21st century collateral ecosystem both at the infrastructure level and at the firm level. There are various angles to look at this from.

Here we take the perspective of a global inventory solution acting as the control centre of the central nervous system.

It envisages a future model for a more integrated, automated, and industrialized system, underpinned by technology, that helps market participants of all kinds to remain profitable in the new more demanding regulatory environment.

Over time, this more standardized, data driven model could incorporate emerging disruptive technology such as Blockchain, Artificial Intelligence, Big Data and Machine Learning to generate further efficiencies.
Increasing Focus on Scarce Resources

Driving the new collateral paradigm is greater attention to the way scarce collateral assets are deployed, in order to:

- Satisfy regulatory ratios such as the Basel III Liquidity Coverage Ratio, Net Stable Funding Ratio, Leverage Ratio and Solvency II
- Source larger amounts of CCP eligible collateral for cleared derivatives trading
- Pledge initial margin and variation margin against uncleared derivatives for BCBS IOSCO uncleared margin reform to meet demanding settlement cut offs
- Expand business opportunities and the firm’s range of counterparties through effective risk mitigation
- Manage the impact of collateral on the firm’s capital and balance sheet.

For the sell side, this new model focuses on improving the return on resources such as liquidity, capital and balance sheet.

For the buy side, the focus is on reducing the drag on returns from having to post more collateral of a higher quality, more frequently.

Enhancing yields through financing long high quality liquid assets (HQLA) in the securities finance markets can also provide additional alpha for the buy side.
What is Global Inventory Management?

Global Inventory Management involves the centralization of the firm’s (collateral) assets across all business lines, pools and geographical locations into a single real time global view through the use of technology solutions such as Broadridge’s.

This consolidated view of assets on a firm-wide basis allows significant efficiencies in sourcing collateral and managing liquidity.

It enables the firm to identify previously fragmented pools on a forward-looking basis.

From there, a central inventory solution allows the firm to mobilize the right kind of collateral to where it needs to be, when it needs to be there.

Centralization also allows the firm to measure and analyse how it deploys liquidity across its trading activities. This forms an important foundation for collateral optimization to take place.

Finally, it enables a more holistic analysis of the collateral portfolio from a risk standpoint. This includes measuring concentration risk, wrong way risk, market risk and stress testing.
A Map of the New Collateral Ecosystem

At the firm level, we can break the processes covered in the diagram shown previously into a series of steps.

1. What Collateral You Have
2. Where it is Located
3. Where you Need it to be
4. Ways to Mobilize it
5. Measuring and Optimizing it
6. Reporting it

We will discuss each of these steps in turn.
1. What You Have

**Integrating Data From Third Party Systems and Data Feeds**

The initial step in any global inventory consolidation exercise is to create real time interfaces with a wide range of third party systems and market/reference data providers.

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The diagram shows the various systems that can feed the global trade and inventory view in real time.

This includes interfaces with custody systems, equity and fixed income trading systems and many others. It is important that this data is reconciled in a timely manner between systems.

This enables a clear real time view of inventory across a multitude of trading activities, business lines and geographies.

Moreover, it facilitates improved communication between siloes such as Securities Lending, Repo and Derivatives desks.

Take the example of a sell side bank offering clearing services. The firm’s collateral manager can easily identify that a given client has spare collateral in its securities lending portfolio.

Rather than calling the client for more margin for its derivatives trading, the collateral manager can use these idle assets.

The most critical aspect of this is ensuring data quality, particularly as there is currently a lack of a standardized data model.

However, regulatory pressures around trade reporting (EMIR/Dodd Frank/SFTR/MIFID II) will drive industry collaboration toward a more uniform approach.
2. Where You Have it

This involves identifying the settlement location for a given asset. To achieve this, it is important to have a clear real time view of your long box at different tri-party agents, (i)CSDs, and custodians, along with what is pledged out to bilateral counterparties and CCPs.

Technology solutions for global inventory that provide real time off the shelf interfaces with the various market infrastructure providers are now becoming essential.

The industry is also moving from an environment of individual competing firms to extended value chains of networked organizations.

To compete effectively, financial institutions must now leverage the synergies gained by this collaborative approach and vertical integration across the value chain.

This integration of data around market infrastructure also includes important information on collateral that is required for regulatory reporting to trade repositories.

It is therefore important to manage your infrastructure providers/intermediaries where reporting is (partially) outsourced to them, in order to ensure reporting is accurate and complete.
3. Where You Need it to Be

This stage of the process involves breaking down siloes. From there, it is possible to aggregate exposures arising from meeting regulatory ratios, hedging (cleared/uncleared derivatives), investments and financing (repo, sec lending, collateralized loans etc).

The firm can then internalize the sourcing of collateral wherever possible by matching collateral sources with collateral sinks.

Most important for sell side firms is firstly satisfying regulatory ratios such as the Basel III LCR and NSFR.

A global inventory solution that can feed in liquidity class data from market data providers and then automatically filter down inventory to show availability of LCR eligible assets for example can provide huge benefits in meeting these ratios.

It is also possible that a pricing differential is arising between securities classed as HQLA and those that do not fall into CCP or LCR eligibility schedules.

It is therefore important to be able to identify and price these assets accordingly. Real time eligibility feeds from CCPs and LCR categories in various jurisdictions can help with this.

For a case study of a client project where Broadridge provided support for LCR filtering in the global inventory manager please see: [http://www.broadridge.com/global-inventory-management-whitepaper](http://www.broadridge.com/global-inventory-management-whitepaper)
3. Where You Need it to Be (Continued)

The next step is meeting margining needs and identifying securities trading special.

All of this activity can be automated and optimized. This enables the efficient sourcing and allocation of assets against collateral needs. It also helps to avoid pledging securities trading at a premium in the securities finance markets as collateral.

The system must also be able to automate the pledging of collateral based on various limitations such as investment strategies.

While collateral management is first and foremost a risk mitigant, it is now gaining more importance as a component of the firm’s overall strategy.

The use of a global inventory and exposure management function is the first step to thinking about the collateral function more intelligently and making it part of your firm’s strategic thinking.

It can help to identify whether incoming collateral is the right kind of collateral vs collateral the firm does not actually want.

It can also allow the firm to build up a picture of whether certain clients/counterparties are a net drain on liquidity or a good source of the right kind of assets.
4. How to Mobilize it

One of the key challenges for our industry is how to mobilize collateral across timezones and jurisdictions to more demanding settlement cut offs. This needs to take place with minimal manual effort, reduced operational and settlement risk, and low friction costs.

In future, it could easily be possible to rapidly mobilize assets held in Asia to collateralize a trade in the Americas.

To truly mobilize collateral effectively will require a higher level of interoperability between (i)CSDs, CCPs (interoperable margin accounts), custodians and triparty agents than currently exists.

Steps have been made through the T2(S) single settlement platform, the collateral highway and collateral hub and plans for utilities such as the margin transit utility.

Increasing uptake of standardized reconciliation and messaging platforms also provides considerable automation in the process of mobilizing collateral.

However, technology investment is still required to make this process as fast, efficient, inexpensive and low risk as possible.

There is also the potential for a collateral mobilization infrastructure based on blockchain technology. This offers significant scope as a means to move collateral around more quickly and efficiently. It appears that at first, regional platforms may arise and it could take many years before we see a truly interoperable global Blockchain platform.

This and other initiatives could be a disruptive innovation for the collateral universe. Firms have no other choice than to closely observe these disruptive trends. However, there is still a degree of scepticism in the industry around the need to completely replace existing infrastructure.
5. Measuring and Optimizing it

"If you can not measure it, you can not improve it."
- Lord Kelvin

In many ways, the new order is all about data and transforming it into, clear, understandable, relevant information that allows measurement and analysis and supports decision making.

Before optimization can occur, there must be consolidated, measurable data. Centralization of information using a global inventory management tool is a vital precursor to this.

As discussed earlier, this new paradigm sees the global inventory view as the brain of the institution’s collateralized trading activity.

The networked collateral ecosystem can be thought of as the central nervous system.

The aggregation and centralization of this data can provide a major step forward in guiding optimal trading strategies and deployment of scarce resources.

It also helps the firm to identify and mitigate the risks shown in the diagram to the right.
The Importance of Data Management

The ability to manage data effectively is now viewed in a positive light by regulators. This includes regulatory initiatives around risk data aggregation such as BCBS 239.

The single counterparty exposure limits proposed in BCBS 283 also require an aggregation of data across business lines. This is because the limits apply across all collateralized business lines.

Data centralization and standardization is therefore key to mitigating risk and complying with regulatory reporting regimes.

It also opens up new trading opportunities, increases the range of counterparties the firm can trade with and ultimately can increase P&L.

It is also key to managing the impact of regulatory ratios.

For the buy side, it is an important way to mitigate the drag on alpha from the need to source more collateral of a higher quality and to boost returns in the current low interest rate/low growth environment.

Before analytics and optimization can be implemented effectively there needs to be a full, clear view of data.

Standardization of data will also ensure an apples to apples comparison and will facilitate automation and straight through processing across the industry.
The Emergence of Pre and Post-Trade Analytics

We are starting to see the industry adopt pre and post trade analytics on a wider scale.

These tools can identify the impact on resources such as liquidity, capital and balance sheet of a given trade or a given counterparty.

The authors of this paper envisage a move to a more granular transaction cost analysis as regulatory costs increase.

This includes deeper analysis of both front office trading costs but also the operational costs of trading with a given counterparty (for example settlement fails, delivery of low quality collateral etc).

The diagram to the right shows some of the considerations to take into account around ways to optimize collateral, liquidity, trade type, capital, balance sheet and counterparty/settlement location.
6. Reporting it

Buy and sell side participants hold tremendous amounts of data. However, without the right toolkit this data has little value.

First one should find out how one can store these massive amounts of data in a practical and easily accessible way. Secondly, understanding the value of this data and ensuring data quality is of critical importance.

Thirdly, owning the right tool kit to ‘mine’ this data and translate it into relevant information is key.

One of the major incentives during the last couple of years to invest into so called ‘data warehouses’ and data transformation has been the regulatory reporting requirements (for example EMIR and SFTR).

Understanding the reporting requirements set by the regulator is a challenge on its own let alone meeting reporting deadlines (set by the regulator). Ensuring the reporting process and quality of data meet the expected standards present further challenges.

Obviously, all of this has to take place within constraints such as a limited amount of resources, a short time to market and a continually changing financial landscape.

Questions to ask include where can I find the data? What is the quality of this data? How can I interpret and translate this data into relevant information? How can it be visualized and presented in a way that is easy to understand?

In addition, it is important to have a strategy for sharing this information across the firm with the correct people. They can then transform information into strategic decisions and tactical actions that result in competitive advantage.
Future Trends

Big Data, Machine Learning & Artificial Intelligence

The investments made in data, information and reporting could be a ‘game changer’ that leads to disruptive innovation within the financial markets. The world is at your fingertips.

First of all, the massive amounts of knowledge should catalyse decision making. In the build up to 2008 and during the credit crisis, a lot of actions were taken retrospectively. In the new data driven world, financial firms should now be able to predict trends, adapt their organizations in response to market conditions and ultimately become more proactive. Furthermore, it creates the possibility to introduce AI (artificial intelligence)/robotics on a scale which has not been possible before.

This sees many new possibilities arising from the convergence of big data, machine learning and robotics. A good example is complex algorithms that can take into account multiple correlations and identify trends to minimize the volatility between a specific exposure and the collateral portfolio covering that exposure. Reconciliations and disputes is another area that could benefit from advances in machine learning and automation.

As well as regulators benefitting from data gathered in regulatory reporting, the reporting participants themselves may also be able to leverage this data, albeit with a time lag. For example, following implementation of the SFTR and EMIR collateral reporting, an extremely large dataset will be available to regulators and potentially market participants.

The employment of big data analytics and machine learning could be used by regulators to predict build ups of systemic risk. At the firm level it could be possible to leverage this data to enrich trading strategies and collateral decision making and make more accurate predictions of market movements. This would in turn allow much more accurate forecasting of what collateral needs will be on a forward looking basis and could also assist with stress testing.

Data analytics and AI could therefore change Inventory Management significantly. Who does not want to make an educated decision? In this case, a rich set of data combined with powerful analytic tools can allow firms to take a far wider set of parameters into account quickly and efficiently. This will pave the way for more advanced decision support tools as the technology evolves.
Future Trends (Continued)

Towards Central Collateral Exchanges

Could we see a future centralized market solution where all of the CCP and Basel III LCR eligibility schedules are stored, aggregated and updated in real time? When fed into the global inventory solution this then allows filtering of inventory to show eligible assets.

From there, firms can offer to lend out a basket of CME or LCH eligible collateral or a Basel III LCR eligible basket of collateral for a given jurisdiction for example.

If traded on a collateral exchange, this would offer considerable automation and straight through processing that would match collateral supply and demand.

Financial Engineering

Would it be possible to package these baskets of collateral into an ETF to improve efficiency? If combined with market data on securities trading special in the securities finance markets this could effectively become a centralized market for collateral with transparent pricing for different tiers of collateral i.e. HQLA LCR level 1a, level 1b, CME eligible collateral, LCH eligible collateral, Eurex eligible collateral etc.

Would it then be much of a stretch of the imagination to engineer derivatives out of CCP eligible collateral?

The benefit of this would be a buy side firm that was short government bonds could source these assets when it needed them for margining without having to hold these types of low yield assets in its portfolio as a buffer.

For a more detailed discussion of these concepts please see the article from Sec Fin Monitor Magazine: Towards a Centralized Exchange for Collateral: [http://www.broadridge.com/global-inventory-management-whitepaper](http://www.broadridge.com/global-inventory-management-whitepaper)
Future Trends (Continued)

Blockchain

The use of a Blockchain technology has the potential to mobilize collateral across the global capital markets supply chain more efficiently, with less operational risk and enhanced transparency versus the existing infrastructure.

The introduction of “smart contracts” to digitize legal relationships between counterparties and distributed ledgers to “chain” together collateral transactions/balances in a real time manner could drive significant reductions in reconciliation effort and transaction latency across the various systems employed in the front, middle and back office.

Due to the rich authentication capabilities of new Blockchain technologies the potential exists to provide real time views into the status of transactions to the correct stakeholders at the buyers, sellers and even regulators. The effective deployment of this enhanced transparency capability will be a key success criteria for the growth of Blockchain.

On the other hand, the use of Blockchain could introduce new IT risks (cyberattacks, SDLC immaturity, information security controls, etc.). In addition, the lack of clear industry standards or full regulatory support may delay wide adoption of this nascent technology.

Nevertheless, Broadridge believes that the potential benefits of Blockchain outweigh the risks. As a result, we are actively investing in Blockchain technology in order to help our clients remain at the forefront of market developments.
Conclusion

Our industry is currently undergoing a period of great change and upheaval. In response, existing business models, infrastructure and technology architectures need to adapt and evolve.

In many cases, these changes are radical and disruptive in nature rather than gradual and evolutionary. Firms need to adapt rapidly to remain profitable, meet return on equity targets and generate alpha in the face of regulatory cost pressures and a low interest rate environment.

Coupled with this is a need for a safer, more resilient global network encompassing the entire value chain for collateralizing trades efficiently and effectively.

As an industry we are now at a critical turning point where we have an opportunity to embrace transparency, standardization, optimization and new technology to design a more industrialized ecosystem that is fit for the 21st century and beyond.

While there are considerable hurdles to overcome to reach this more automated, intelligent and interoperable future, there are major benefits to be gained from its realization.

It is only through collaboration between market participants of all types that this vision will become a reality, coupled with an openness to new ideas, the embracing of new technologies and a shared investment in the many exciting future paths for our industry.
About the Authors

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Previously, he was marketing director at 4sight Financial Software. In June 2016 4sight was acquired by Broadridge and the 4sight Securities Finance and Collateral Management System rebranded as the Broadridge Securities Finance and Collateral Management Solution.

In his 11 years at 4sight, he specialized in securities lending, repo and OTC/listed derivatives collateral management solutions. Prior to that Martin worked as a business expert in technology systems for risk management in the energy industry.

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Previously he was a senior business analyst at 4sight Financial Software and in prior roles he was Product Manager Treasury and global fund services at KAS BANK N.V.

He has also worked as a collateral manager and on the balance sheet and collateral desk, and has been involved in a number of major initiatives at KAS Bank to implement a global inventory management and collateral optimization solution.
The Broadridge Global Inventory Management Solution

The Broadridge Inventory Management solution offers:

- Aggregated realtime global inventory integrating cash and non-cash inventory from multiple external systems
- A centralized and detailed data model supporting all aspects of collateralized transactions and associated lifecycle management
- Aggregation of legal agreements (CSA, GMSLA, GMRA etc) and collateral schedules, combined with sophisticated eligibility, concentration and haircut rulesets
- Once the inventory is aggregated, timely and correct, the system offers the ability for traders, collateral managers and liquidity managers to slice and dice inventory at any level of the profit centre hierarchy
- The Inventory Manager also shows clear views of both pending and settled positions up to 30 days into the future.

This enables powerful grouping, sorting, and filtering of global, real-time inventory containing 100% of all cash, firm, GMRA, GMSLA and ISDA trades and other sources/uses of inventory to create a view of the world aimed at a given trading outcome. You can then repeat the above to create a library of re-usable templates to perform scenario analysis, apply your templates to real scenarios and achieve your goals.

For Example:

- A single point of call to gain complete transparency of where inventory is currently held in real time across all business lines and geographical desks including (collateral a/c, trading a/c, iCSD, external custodian, counterparty) at any level of the profit centre hierarchy
- Ability to identify and communicate internally held client long inventory held by the securities finance desks for use as margin before requesting additional margin from clients
- A clear view of assets available for rehypothecation
- A front office optimized trading goal such as the identification of a basket of low haircut, cheapest to deliver, HQLA assets to pledge to a client asking for an LCR-driven collateral upgrade trade
- A strong foundation for collateral and inventory optimization.

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About Broadridge

Broadridge Financial Solutions, Inc. (NYSE:BR) is the leading provider of investor communications and technology-driven solutions for broker-dealers, banks, mutual funds and corporate issuers globally. Broadridge’s investor communications, securities processing and business process outsourcing solutions help clients reduce their capital investments in operations infrastructure, allowing them to increase their focus on core business activities.

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