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Ready for Digital Regulation?

Rethinking your approach to enterprise data management for capital markets in the new age of quantitative regulation

March 2019

JWG

Making sense of financial services regulation

Contents

Foreword

MarkLogic works with many leading financial services organizations on solving their data challenges better and more quickly. A key challenge for these organizations has been, and we believe will continue to be, coping with the growth and the rapid change in financial services regulation.

We commissioned this independent research because we wanted to understand better the scope and breadth of regulation that is scheduled to be implemented in the coming years to inform both our customers and ourselves. We asked JWG to take a global approach, to reflect our customer base, and to look at trends over the medium-term.

We believe that data lies at the heart of any organization's future strategy and is particularly important in how financial organizations respond to current and future regulatory challenges. To deal with these systematically, in a scalable manner and be responsive to regulatory requests, there is little choice but for firms to take a strategic and digital approach across functions and avoid the building of new application and data silos to tactically cope with the latest deadline. As this report reveals, regulators are thinking along these lines too.

We hope you find the report insightful and useful in driving your own strategies.

Giles Nelson
Chief Technology Officer, Financial Services at MarkLogic

I. Executive Summary

As the pace and complexity of regulatory requirements continues to increase globally, so too must the data integration capabilities of financial services firms and regulatory agencies. During Q4 2018, JWG conducted in-depth interviews with multiple senior executives from 12 global financial institutions to better understand the challenges that firms are currently experiencing in meeting their regulatory reporting obligations. This paper builds on that research and subsequent discussions with MarkLogic, the leading data hub platform provider to financial services firms, to look at the data foundations underpinning some of these difficulties and the potential way forward for firms wishing to utilize an alternative approach. Here are the summary research findings and implications for the data management systems of financial services firms:

Research findings

- JWG's research finds that the **pace of regulatory change continues to be very high with no prospect of slowing down**. In response to the financial crisis the G20 published a 93-point action plan in 2009 which resulted in 50,000 regulatory documents in the subsequent 5 years and this new research shows that the pace of change hasn't slowed. Based on our analysis there will be 374 'legislative initiatives' targeted at financial services firms by 2021, and we predict this number will continue to grow beyond that time horizon.

- Regulation is now industry wide, **cutting equally across the buy and sell-sides**. Of the 374 legislative initiatives, we found that over 90% are applicable to both buy and sell-side firms. Asset managers, pension funds and hedge funds have traditionally delegated much of regulatory compliance to the sell-side making the buy side much less well equipped in terms of resources and know-how to deal with the on-coming deluge.

- It is not just the volume and pace of change which challenges firms; it is also the **enormous breadth in terms of activities, processes and functions** which will be governed by new rules. Firms must comply with similar but different rules multiple times. In checking compliance, regulators are increasingly asking for the audit trail of the decision-making process. The 'how' is becoming as important as the 'what' and the 'ad-hoc' requests are becoming more frequent.

- Regulatory policy has **shifted from a narrow focus on single data points to a more holistic view of the whole system**, creating new requirements for more agile and intelligent data management systems. Transaction and party data are heavily impacted by the growing number of rules governing trade surveillance and associated pre and post trade transparency rules.

- Compliance costs at financial services firms have gone through the roof since 2009 and **continue to grow in a way that is totally unsustainable**. A recent survey found that firms typically spend 4% of their total revenue on compliance, with an estimated increase to 10% by 2022.

- Under substantial pressure to meet new and changing regulatory requirements senior executives at large financial institutions acknowledged that **using a project-based, highly-manual, siloed approach** to regulatory implementation was not efficient nor sustainable.

- Digitally empowered regulators are now out in front of the RegTech agenda and some are **aiming toward 'quantitative regulation'** in which machine-readable regulation is applied to firms in an automated manner.

Data management implications

- Given the changing landscape, the way a firm manages its data has become a board-level issue, where the **rationalization of legacy architectures and formation of an enterprise-level data strategy** needs to be a top priority. Emerging technology programs based on AI, machine learning, natural language processing and distributed ledgers will support automation objectives but will not be possible to implement effectively without solid data foundations and governance practices.
- Financial services firms should focus on **creating a strategic, 360° view of their data** across their legacy systems as a significant first step. Leading financial services firms have already started the process with a data hub. A data hub can scale beyond the limitations of existing systems, ingest data from all sources, cleanse that data, provide secure multi-tenancy, and provide an audit trail across private and public clouds.
- The move toward quantitative regulation will **put a premium on internal and external data integration**. A data hub provides the optimal platform for effectively handing complex multi-model data integration and automating interactions with regulatory systems of record. The end game is a fully-automated digital interface between regulator and firm that enables regulatory data straight-through processing (RegSTP). RegSTP capabilities can do for compliance what STP did for equities trading in the 90s – radically reduce the amount of human 'touchpoints' and significantly reduce operational costs associated with regulatory compliance.

II. The pace of regulatory change

- *Regulatory noise levels remain high and we find 374 FS regulations being implemented by 2021*
- *This impact more than ever is industry wide, cutting equally across the buy and sell-sides*
- *Regulation is imposing more restrictive controls on firms' use of data*
- *The regulatory environment is less tolerant of firms slow on the compliance uptake*
- *Regulators are increasingly less tolerant of poor data quality*

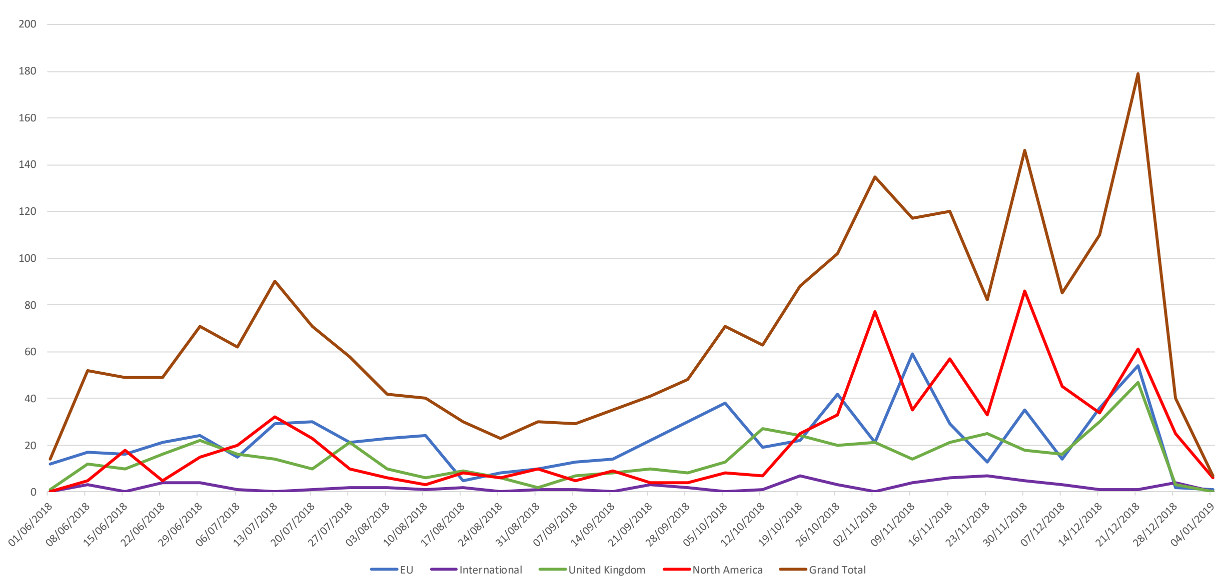
Making sense of rising noise levels

Five years after world leaders agreed global FS reform objectives in 2009, JWG conducted a research project[1] to compile a comprehensive analysis of 50,000 documents which their plan had produced. One of our widely reported conclusions was that the page count, if printed, could top three Eiffel towers by 2020.

Four years later we have repeated our global survey and found a much more mature landscape, but one that continues to evolve rapidly. In total we found 374 'legislative initiatives' targeted at financial services currently due to come into force in the next three years across the globe. Our analysis of the texts produced in the 2nd half of 2018 alone found over 2,150 documents which were predominantly from Europe (33%) and North America (33%).

Last year, the entire fourth quarter showed very high activity levels, as shown in Exhibit 1. Up through the summer the average number of publications per week was on track. In Q4, the game changed. Yes, we have Brexit but the BAU noise levels from rule making has kicked in – especially in the US. They are too many to list but for illustration the SEC published updates on the FAST Act, company filings, filling of tagged fund data, from ADV and listing standards from ETD in the second half of 2018.

Exhibit 1: Weekly Transatlantic regulatory document publication 2H18



Source: JWG RegDelta, June 2018 – December 2018, JWG analysis

With all that is on the agenda, we expect publication levels to remain high in 2019 and 2020. It would be safe to assume this level of change is now the 'new normal' and business must therefore adjust how to address regulations in this context.

This will mean being able to have automated, scalable and smart ways of filtering the noise and actioning it appropriately.

Diagnosing the global changes required

The average amount of compliance reading is starting to break humans' capacity to absorb rule changes – if it hasn't already. The sheer number of changes to track will have a big impact on senior management and the people the firm relies on to ensure that they are up to date. It will no longer be possible to source subject-matter expertise once a year for a regulatory 'tune-up'.

As ever, the financial, regulatory and reputational risks of missing a single update can cause a disproportional loss if the firm fails to spot a regulatory change and action it appropriately. Unlike that rattling sound in your car, you can't afford to ignore the regulatory noise. Firms must find ways to comply with similar but different rules multiple times, whether it is different trade and transaction reporting regimes asking for slightly different cuts of similar data or contrasting settlement procedures.

Understanding the new depth of intervention required

One thing that global regulators can agree on is that more transparency is good and more control over the 'how' is required.

Taking a sampling of the data-focused obligations of the new regulations it is clear that the demands on financial firms have changed substantially in just the past 2 years. As Exhibit 2 shows, policy has shifted from a narrow focus on single data points to a more holistic view of the whole system.

Exhibit 2: Ever more holistic regulatory data requirements

Topic	Old requirements	New requirements	Data Issue
KYC	Every firm maintains their own view of their clients' data (4th Anti Money Laundering Directive)	Firms will be responsible for ensuring that discrepancies in ultimate beneficial ownership data are reported to registrars (5th Anti Money Laundering Directive)	Intra-firm and inter-firm understanding of customer data
Trading	No definition of obligations to control algorithms, e.g. no algo ID requirements	Each trading algorithm must be uniquely identifiable and controlled (MiFID II)	Persistent view of algo code, testing and behavior
Surveillance	Manual spot checks of trade and communications data are sufficient (Market Abuse Directive)	Automated trading and communications monitoring for market abuse monitoring (Market Abuse Regulation)	All data relating to trades, traders and clients must be maintained and indexed
Controls (personal data)	Required to obtain consent from individuals to hold their data (Data Protection Act)	Right to be forgotten and requirement to understand lineage of personal data (General Data Protection Regulation)	Data relating to individuals must be linked and centralized

Source: JWG analysis of key regulatory obligations, February 2019

It is not just the volume of regulation which challenges firms however, it is also the enormous breadth in terms of activities, processes and functions which are governed by new rules. Gone are the days when regulation focused purely on front office trading activity. Regulations govern how applications can be used and implemented to how they must be functionally organized to what can and can't be done with their data.

The buy-side has traditionally delegated a large amount of compliance to the sell-side and this has left them under-resourced in terms of people and systems as the regulatory culture shifts away from tolerating any kind of delegation of responsibility. This means that the buy-side is now under-pressure to improve their ability to meet regulatory demands at relatively short notice.

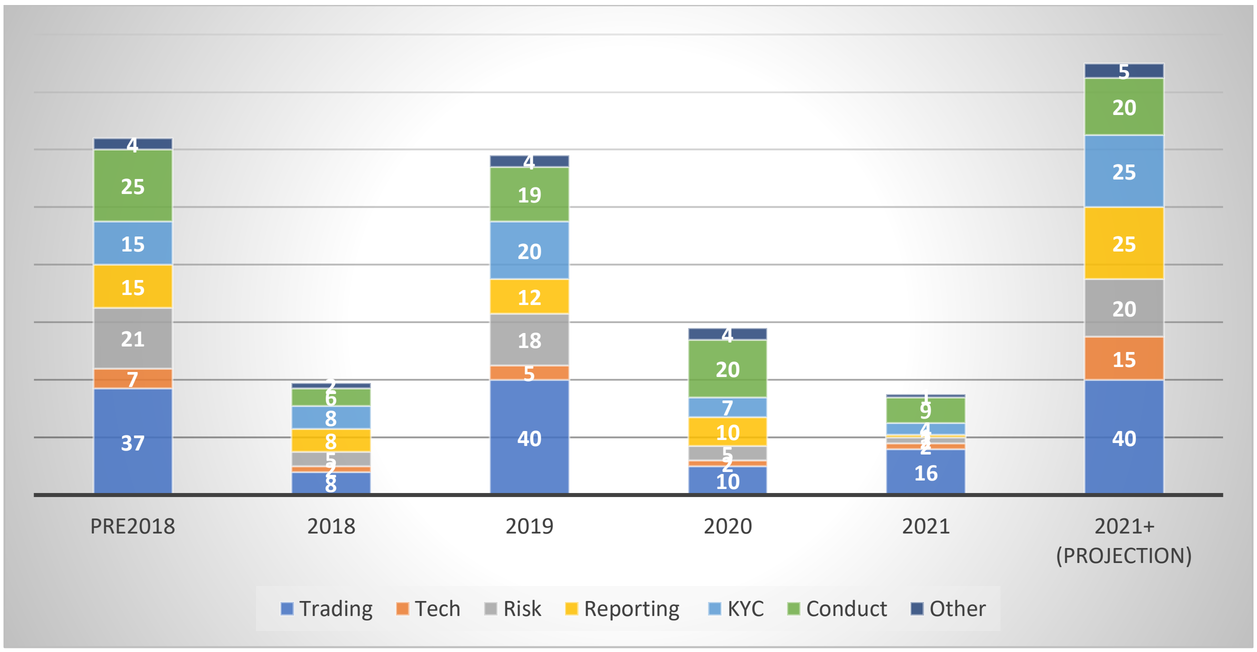
JWG's quantitative analysis: the breadth of impact

JWG have used a quantitative research method to evaluate the global regulatory pipeline. Drawing upon RegDelta, our next generation regulatory data platform and our detailed experience of global regulatory publications, we analyzed over 100 different regulatory websites to understand their current plans and priorities.

When we discuss 374 legislative initiatives, we mean not just one document or publication, but rather more broadly a package of proposals that is being put forward by a regulatory or policy maker under one umbrella. The enormous and challenging MiFID II for example, represents just one of these legislative initiatives. We have completed this analysis by looking at the major financial centers across the world in Asia-Pacific, EMEA and the Americas.

We find that trading and conduct are the most prolifically regulated themes, see Exhibit 3 for more detail. This follows trends of the past few years in which such activities have attracted huge attention from regulators globally. There are also a significant number of new legislative initiatives in both the KYC/AML space as well as reporting, which have both been significant growth areas for regulation in recent years.

Exhibit 3: Regulations by implementation date and topic (524 total)



Source: JWG analysis of global regulation going into effect between 2014-2021

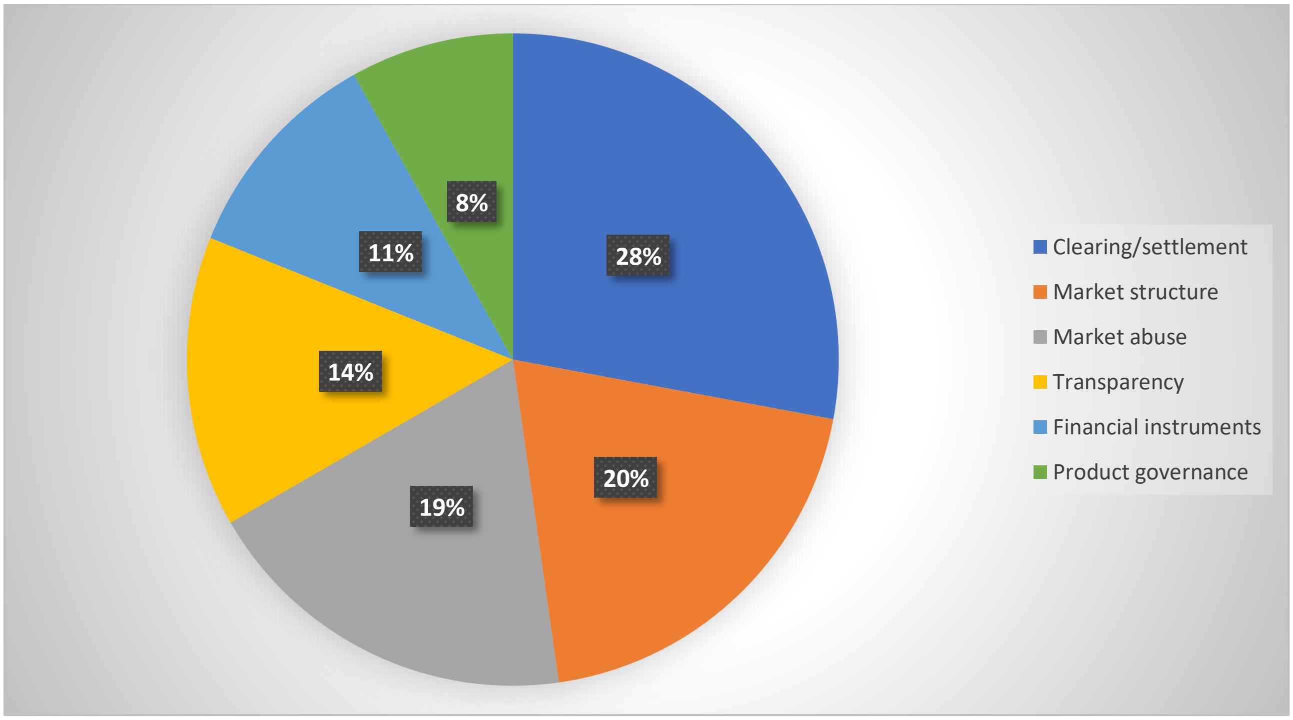
This means that pace and complexity look to remain constant as we go forward through 2021 and beyond.

There are several things that become clear when we plot the regulations by their respective themes through to 2021:

- Just over half of these initiatives are on the books of firms currently (i.e. pre 2018). These will typically be regulations which are now in remediation, in other words, the initial implementation deadline has passed, but firms are still actively working on refining their compliance approaches.
- We see a large spike in 2019 before a gradual lull into 2021. However, this is not the end of the story. By analyzing historical trends and the stated priorities of regulators we can make an educated guess in regard to further publication levels and themes over the next 3 years.

The next step in our analysis has been to take these thematic classifications to a greater level of detail. We have broken the initial themes down into more detail to better model global regulatory requirements. By way of example of this more detailed breakdown, we have taken the trading theme and gone into more detail in exhibits 4 and 5 below.

Exhibit 4: Trading initiatives broken down by theme



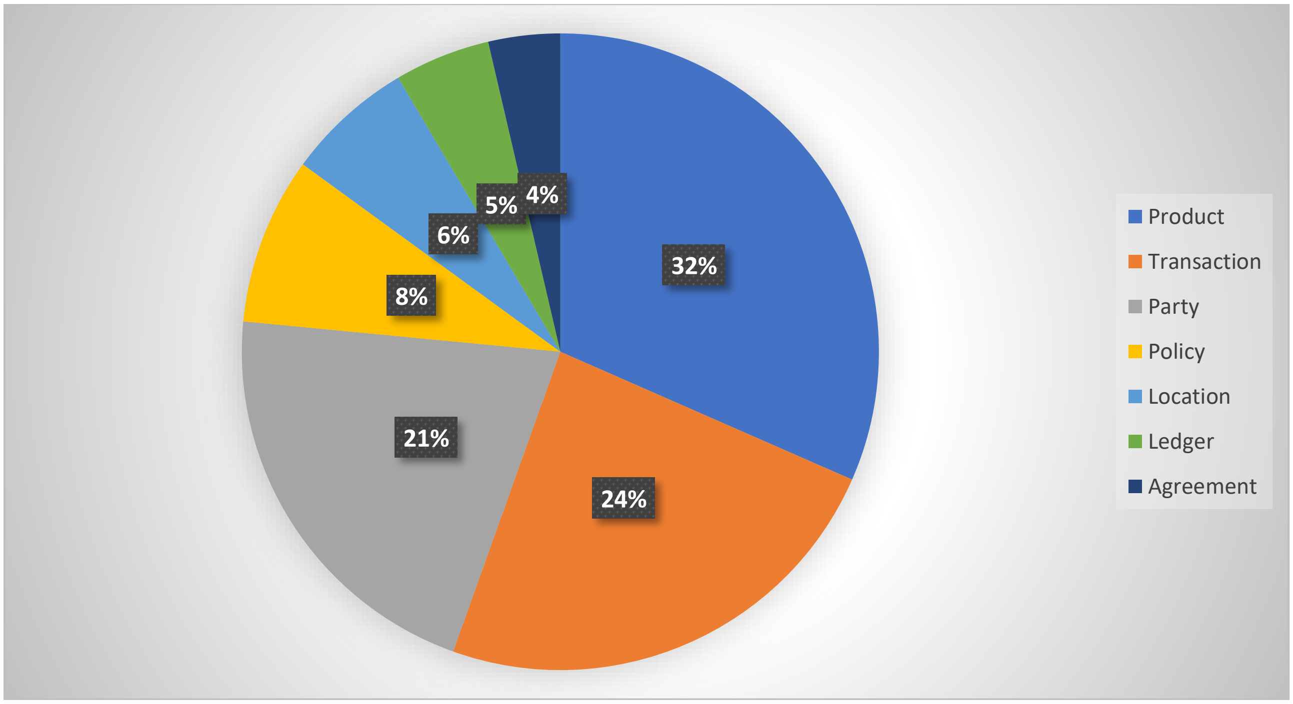
Source: JWG analysis of 111 global trading regulations by topic

Taking the 111 trading initiatives in Exhibit 4 we can see how they break down into more detailed topics. Nearly 40% of the initiatives are related to market structure and abuse regulation, with a third of the initiatives related to regulations for transparency, financial instrument and product governance. Clearing and settlement topics comprise 28% of total initiatives.

Clearing and settlement rules building on the EU's EMIR (European Market Infrastructure Regulation) are becoming increasingly prevalent globally. Indeed, clearing obligations requiring that all OTC derivative contracts subject to mandatory clearing are becoming commonplace. Transparency rules requiring the publication of pre and post trade data relating to price, volume and timing of transactions are also becoming more common and are the main driver behind 14% of trading initiatives being related to transparency.

Using a simple taxonomy of data types which we have linked to these themes we can start to understand not only the types of data that will be impacted by new regulation through 2021, but just as crucially what the interdependencies between the different legislative initiatives are.

Exhibit 5: Number of trading regulations impacting data types



Source: JWG analysis of 111 global trading regulations by data impact

What this tells us, just looking at the trading example, is that the data impact of these new rules is staggering in its breadth. The most impacted data type is product data; this is to a large extent due to an increase in the granularity of product identifier which regulators are expecting combined with new product governance requirements such as those in MiFID II requiring firms to be much more precise about how they classify and then market their financial products.

Transaction and party data are heavily impacted by the growing number of rules governing trade surveillance. In particular, an emphasis on automated monitoring is forcing firms to ensure that transactional data is correctly tagged and linked to customer and party data. Further demands on transactional data are also being driven by the aforementioned increasing in pre and post trade transparency rules.

As described at the outset of this paper, firms' entire data estates are impacted by regulation but in the interests of brevity we do not go beyond the trading example within this paper.

Overall, the data analysis which we have conducted demonstrates the enormous volume and breadth of regulatory requirements which financial services firms need to contend with. In our estimation, it has been clear for some years now that traditional compliance approaches are not sustainable in relation to this volume and breadth.

Regulatory expectations

It is not only the rules themselves which are changing. The way in which regulators enforce them is also changing in a way that places further challenges on firms. Regulators are no longer only interested in inputs and outputs, they are also interested in the decision-making process around compliance. In other words, regulators are increasingly looking at the 'how' as well as the 'what'.

As a result, the question for firms is no longer simply "are their transaction reports filled in correctly?" but "was the process by which they made decisions about how to fill it in 'reasonable'?". To emphasize, how the report was created is just as important as the report itself. This *data lineage* is becoming more important. Regulators expect firms to understand where the data came from, how they know it is right, and to be able to prove this to them.

Additionally, there is the fact that enforcement is becoming more 'ad-hoc'. Regulators are shifting from scheduled periodic checks to unplanned ad-hoc requests of firms. This means that firms need to be agile in their ability to respond. Regulators will expect structured and timely responses to such requests, and this represents a significant shift in the expected compliance capabilities of firms.

This is in the context of a regulatory environment which is less tolerant of firms that are slow on the compliance uptake. A combination of factors including the LIBOR scandal and the significant delays to the implementation of the MiFID II framework has seen regulators, particularly across the EU and North America, have much greater inclination to come down hard on firms caught out not living up to regulatory standards.

Indeed, this is also not the only way in which regulators have been altering their behavior. Traditionally thought of as laggards in terms of embracing new technologies, regulators globally have begun to get out in front of the 'RegTech' agenda. Led by first movers such as the FCA in the UK, the MAS in Singapore and the CFTC in the US, regulators have started to get behind ideas of using innovative new technologies throughout the regulatory process. Sandboxes, TechPoints and Hackathons sponsored by one or many regulators are becoming more and more commonplace with the message emanating from authorities that innovation and automation is a must. The days in which firms can afford to think of the idea of investing in RegTech as 'a nice to have' are fast coming to an end.

As a case in point, near the end of his term, CFTC Commissioner Giancarlo laid out his vision for a quantitative regulator in November 2018: "*The right path, indeed, the only path is to combine robust data collection, automated data analysis and state-of-the-art artificial intelligence capability to transform the CFTC into a highly effective, big data math shop – what I call a "Quantitative Regulator."* The Commissioner is essentially laying out a vision in which regulators are equipped to understand firms' data much more extensively.

It is not only at the CFTC where this kind of thinking is gaining prominence. RegTech was on the agenda at the recent World Economic Forum in Davos and politicians and regulators across the globe are now mobilizing to establish their strategies and long-term plans.

III. Sizing the data prize

- *Compliance costs have gone through the roof since 2009*
- *Data hubs can empower business and their lines of defence to work from one data source*
- *A digital regulator could inspect the hub's audit trail to understand the status of compliance*
- *A good data foundation is the key to being able to utilize new and innovative technologies*
- *Ultimately, shared central utilities which are regulator-driven, can address many of the concerns raised by regulators*

Constraints of the current approach

One of the main takeaways from in-depth interviews conducted by JWG with multiple senior executives at large financial institutions was that a project-based, highly-manual, siloed approach to regulatory implementation is painfully typical across the industry. Regulation tends to be addressed in a piecemeal manner, with disparate projects being set up when a new regulatory obligation is defined.

If this describes an IT strategy you are familiar with, you will probably be used to customers complaining that IT is a bottleneck between the source of the data and the target of both the business and the regulators. This is generally because an extensive amount of business analysis needs to be completed before the entire system can be modelled in tables and rules defined for processing the data. In some cases, this results in entirely new compliance systems being defined that replicate the business' data in order to fulfil regulatory obligations.

These problems are often created by the implementation process leading to poor institutional knowledge about data definitions and the modular approaches to technology built creating these data silos. Change functions will take on the new rules and try to interpret them in terms of how they apply to the organization, legal will then take a legal view, which may or may not be different. Compliance will take these interpretations and try to tweak policies and procedures.

Even when data is of requisite quality it tends to be stuck in source applications, and not necessarily available to do the job it is needed for. The good news is that new approaches can empower an organization to rein in costs and implement regulatory change in a more effective way.

The size of the prize

The challenges of getting to the correct interpretation of the requirements and how to translate them into compliant and executable business rules is often discussed in the industry. Complex legal obligations are typically captured from different sources which are updated frequently, making it very difficult for large organizations to keep track of what transaction reporting business logic or code needs to be updated to correctly reflect the law. Firms understand that this process of having to manually review and update multiple systems to deal with new or amended rule interpretations from different jurisdictions has ultimately increased costs and the risk of non-compliance – while producing little upside.

Compliance costs have gone through the roof since 2009 and continue to grow in a way that is totally unsustainable. It is clear now, and arguably has been for some time, that firms need to adapt their approaches, if they haven't already in order to reduce this unsustainable growth.

Taking a tier one bank as an example, its revenue in 2016 was $69.9B. Compliance costs are estimated by Duff & Phelps at 4% of revenue on average[2]. This would translate to a minimum of $2.8B spent on compliance per annum. Now take the U.S. as a whole with 273,910 compliance officers and assuming an average salary $100,000, the direct cost of compliance is $27.4B. On this basis a 5% efficiency saving for example, would deliver a saving of $1.39B.[3]

A report by Bain Consulting estimated that Governance Risk and Compliance spend accounts for 15%-20% of "run the bank cost", and 40% of "change the bank cost" – with total compliance cost set to double by 2022. As noted by one Chief Data Officer of a large global bank, the business "needs to get cheaper to survive". In their view, the high operational and maintenance costs could have spill-over effects to front-office activities and ultimately, trading volumes.

Firms have attempted to reduce these costs, taking mutualized approaches to the interpretation problem. The prevalence of attending internal and external working groups – such as Trade Associations and JWG's Special Interest Groups – to develop 'industry-accepted' interpretations of the rules have greatly increased as firms try to share costs and reduce them this way. However, many continue to rely on consultants to do the job, and even send consultants to such groups, compounding the problem of poor institutional memory.

There are significant opportunities for efficiency savings in reducing the duplication of processes and sourcing, slicing, and dicing of data which is not used anywhere else in the bank. The following section explores the use of hub architectures to deliver these savings.

Empowering users with data hubs

If you ask senior managers at big firms what the biggest barriers are to effective compliance, *poor quality data and a lack of data consistently rank near the top*. It is commonplace to hear complaints of 'garbage in, garbage out' or 'data silos in legacy systems'. To a significant extent this is a result of the aforementioned reliance on relational databases which are ill-equipped to deal with a rapidly evolving set of business requirements from many different perspectives.

As described in Exhibit 2, firms are increasingly being required to link and match data sets typically contained within different systems and applications for compliance purposes. This requires a level of flexibility that is hard to achieve with data stuck in silos. This is particularly true given that with the high pace of regulatory change new data sets are being added on an ongoing basis. Firms require a way to, in an agile manner, bring their data together out of applications and leverage an actionable 360° view. In other words, firms require an enterprise data hub.

In our January 2019, reporting paper[4] we explored the data hub architecture for trade reporting purposes. In this research paper we have explored the use of the hub architecture for other purposes. We found hubs being used for a variety of business *and* regulatory purposes – from trading to counterparty management and even product strategy. The architects we have spoken to extol the virtues of using hubs to empower data consumers so that they can stitch together their own models in a 'DIY' manner.

For example, by being able to relate the passport identifier and the trader identifier linked together in a hub, one can quickly get a view of new information that is added to an employee's record that might explain trading pattern anomalies due to stressful life events. Critically, if the trader leaves and exercises her right to be forgotten, the appropriate data policies and controls can be applied. In this way, all data consumers are getting faster access to the information they need to perform their functional role.

The architects we spoke with identified the key to making a data hub work: Ensure attributes that must not change are agreed in a 'data agreement' with the system's owners. In this way, the business is working together with their second and third lines of defence from the same data set. This means that when a digital regulator comes looking, they will find an audit trail that shows how policies have been applied. In short, with a data hub, the regulators' jobs become more straightforward as their questions can be answered with data that is used to control business activity.

A data hub can scale beyond the limitations of existing systems, ingest data from different sources, harmonize that data, provide secure multi-tenancy, and be able to provide an audit trail across private and public clouds. Such a hub could be described as a 'virtual data room' – built on the principles of 'data governance, profiling, lineage, and transparency'.

Senior managers are personally incentivized to break down data silos and develop a much more intelligent view of their data resources. When senior managers, personally accountable under rules such as the FCA's senior managers and certification regime (SMCR), cannot see how activities in one silo are related to activities in another, the chances of misreported data are significant. The opportunity to reduce risk by replacing existing low-tech approaches to data management is huge. It seems clear that embedding this notion with good, transparent data will be key to effective monitoring and oversight of behaviour within the investment firm.

This concept is not new, especially in large retail banks that want to use more data from more sources across multiple business units to understand how to effectively and efficiently engage customers for greater loyalty and new selling opportunities. However, a broad, informed, real-time view of the business should not be limited to customer happiness and marketing metrics. Combining related or even disparate data sets can reveal patterns, correlations, or causal relationships that, when translated into opportunity or risk, can provide investment firms with a valuable head start with their regulators.

Of course, in some cases data hubs can service the needs of more than one firm. Independent, shared central utilities, which are regulator-driven, can address many of the concerns raised by the regulator. Different market participants, including clearing agents, counterparties, and most importantly the regulator, would have permissioned access to such a utility, allowing them to clear, match, and monitor market abuse and systemic risk from a central source.

While this may seem like a utopian end-state, it is technologically feasible. Several existing data management firms provide this level of connectivity amongst different systems and standards. As technological capabilities continue to grow and RegTech firms mature, the quality of these data solutions, and the benefits they could provide in terms of automation and straight through processing, is significant.

Furthermore, a good data foundation is the key to being able to utilize new and innovative technologies such as AI, machine learning, natural language processing and distributed ledgers. Without a comprehensive, high quality data capability such ambitious use of technology is condemned to fail from the start.

IV. Conclusion

There are a great many steps required before the industry can get to a state of 'quantitative regulation' in which machine-readable regulation is applied to firms in an automated manner and data hubs provide the required view of the firm. What is clear is that the journey towards this, or at the very least a higher tech alternative approach, needs to start now.

Firms must begin in earnest to apply the lessons of the past and present failures to implement new approaches, and it is clear where this must start. Data is foundational to being able to meet the compliance challenge of the continuing pace of regulatory change. Data hubs which enable firms to have 360° view of their organization will be critical. In this regard it is important to recognize that implementing vastly enhanced data capabilities is not a solution in itself, rather it is the basis on which to build a better approach.

Implementing the right data strategy is the key to being able to utilize new and innovative technologies such as AI, machine learning, natural language processing and distributed ledgers. Without a comprehensive, high quality data capability such ambitious use of technology is condemned to fail from the start. Centralizing existing legacy systems, bringing data out of applications and leveraging a 360° view can be a huge first step.

Firms can engage approaches that allow them to centralize their data gradually by prioritizing use cases, while respecting legacy systems and switching them off in a more manageable, measured way over time, as appropriate. Ultimately the business case for doing this must also be clear, and in order for this to happen data needs to no longer be treated as an after-thought. There is huge potential for savings in treating data as a strategic resource.

With many voids to fill and often a limited budget, firms should be taking a proactive approach to rethinking their data strategy. As always, any change to the infrastructure needs to be well thought through and time is of the essence. To get firms started we have thought of 5 key questions for senior managers to ask their Chief Data Officers and data architects now:

1. Are we taking a sufficiently strategic view of data, both from business and technology points of view? Do strategic data initiatives have board visibility?
2. Are we able to respond to ad-hoc regulatory information requests in a systematic and timely way?
3. Do we have the right data foundations in place to assemble a holistic, 360° view across the enterprise and across all the types of data within it?
4. Do we have the right data governance to empower the business to safely access data without posing risks?
5. For reporting, can we prove the lineage of our data?

Ultimately, a smarter, cheaper, and safer compliance strategy heavily depends on the efficient allocation of resources and commitment to getting this work done.

V. About this study

At the end of 2018, JWG conducted in-depth interviews with multiple senior executives from 12 global financial institutions to develop the insight published in a subsequent paper titled 'Time to Rethink Regulatory Reporting?' The paper detailed the challenges that firms are currently experiencing in meeting their regulatory reporting obligations. This paper builds on that to work to look at the data foundations underpinning some of these difficulties and the potential way forward for firms wishing to utilize an alternative approach.

In conducting this research JWG used a quantitative research method to evaluate the global regulatory pipeline between now and 2021. Drawing upon RegDelta, our next generation regulatory data platform and our detailed experience of global regulatory publications we analyzed over 100 different regulatory bodies to conduct this analysis. This analysis comprised of studying regulators' workplans, newsletters and briefings to understand their plans and priorities.

2018 figures are based on JWG RegDelta tracking. In total, JWG loaded over 2,100 regulatory documents which were published in 2H18. This is by no means a complete dataset of everything that could be relevant to the largest firms, but it is a good start and representative of what a tier 2 transatlantic trading bank would need to be aware of.

We also drew upon discussions with MarkLogic about their client experiences in deploying their technology at some of the biggest financial institutions in the world to better understand the current and potential future state of data architecture and use of data hubs.

VI. About JWG

We are operations and technology professionals, trusted by the global financial services industry as experts in regulatory change management. We pride ourselves on capturing every financial services regulation published the world over and are the only organisation to set ourselves this global challenge.

For the past decade, our team of independent analysts has helped the industry interpret large quantities of regulatory reform and action it in a smart and intelligent way. JWG work with trade bodies and regulators to facilitate the understanding of regulatory change and its impact on financial institutions, both sell and buy-side, market infrastructure and the vendors that serve them all. Facing the ever-pressing challenge of understanding, enacting, complying with and facilitating regulation, respectively, JWG play a crucial role, bringing together a wide variety of stakeholders and pooling their knowledge and understanding to provide invaluable insight, context and feedback.

We do this in three ways. Firstly, we track the totality of the FS reform across the globe in order to educate the market via our publications and events. In parallel, we run collaborative special interest groups to crowdsource the impact from legal, compliance and operational perspectives. Finally, we offer the world's first regulatory change management platform, RegDelta.

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VII. About MarkLogic

Data integration is one of the most complex IT challenges, and our mission is to simplify it. The MarkLogic Data Hub is a highly differentiated data platform for simplifying data integration, enabling organizations to achieve a 360º view faster than ever. By removing friction at every step of the process, MarkLogic helps organizations gain agility, lower IT costs, and safely share their data.

Organizations around the world trust MarkLogic to handle their mission-critical data, including 6 of the top 10 banks, 5 of the top 10 pharmaceutical companies, 6 of the top 10 publishers, 9 of the 15 major U.S. government agencies, and many more. Headquartered in Silicon Valley, MarkLogic has offices throughout the U.S., Europe, Asia, and Australia. For more information, visit www.marklogic.com.

Endnotes

1 'G20 FS reform: will you survive or thrive?' link here

2 'Compliance costs to more than double by 2022', Duff & Phelps as reported by Financial News, January2017

3 'A New Paradigm for Regulatory Change and Compliance' The RegTech Council, March 2018 link here

4 Regulatory Reporting: Time for a Rethink? January 2019 A JWG Whitepaper link here

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Making sense of financial services regulation