

Risk Management

A Differential Diagnosis

JOHN A MORRISON
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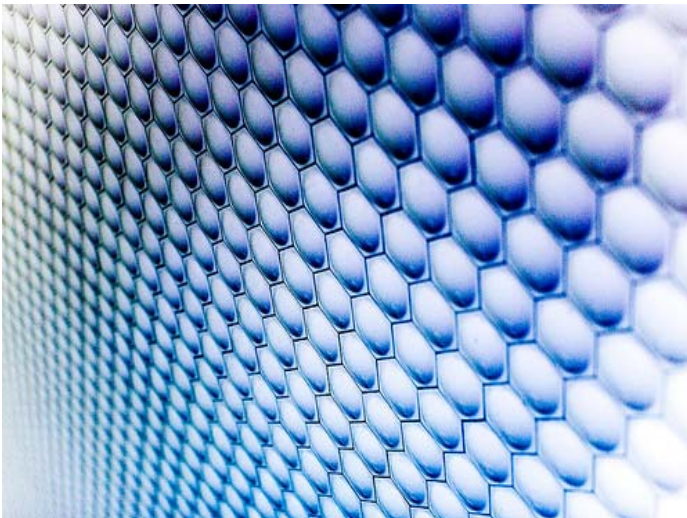
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EXECUTIVE SUMMARY

The role of Model Development Environments (MDE) for Financial Predictive Analytics is crucial; the question is how to staff them and how to make them functional (not dysfunctional as they have been). They are the Gaussian monster at the heart of a lot of the problems the world is currently experiencing. Technology for Model Development is advancing in the fast lane, particularly through R+REvolution Computing¹, but we all know that Quantitative Analysts, left to their own mad scientist devices, don't always get it right. To make them functional we need to understand where they fit in. We have to define a context for them.

The only answer is adherence to standards. Supervisors should specify more precisely and transparently the risk measures they require to see. I mean mathematically. Value at Risk (VaR) is now a common term in both American and European English. It's a standard now, pretty well everyone who should, does now know what it means, even if they didn't two years ago. So why do we let quantitative analysts constantly specify and re-specify various flavours of it, like someone in a laboratory engineering different flower colors or scents. That's OK if the definition of VaR is a commercial advantage; it is not! An old pre-credit crisis smokescreen.

Specify the standard we have to adhere to Mr. Supervisor and we can all move on to the next generation of Predictive Analytic software engineering appliances and stop the obsessive behavior where each bank has some

different private quantitative language describing its risk position. Where an analytic is perceived to be key to the transparency of a financial institution, then that analytic should be publicly specified and agreed between all authoritative stakeholders. That would allow the software engineering industry and its banking and financial customers to understand what numbers simply need to be on-demand and what other numbers are less specifiable and thus open to debate.

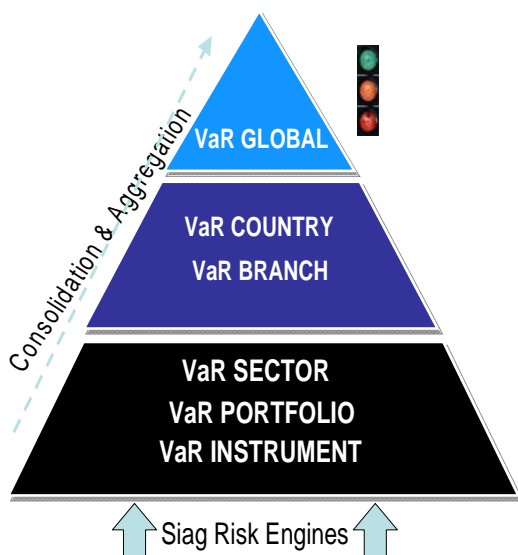
In the latter domain lies the functional role of the Model Development Environment (MDE), the former would be where risk software providers such as Siag² and FRS³ can do their part. They are point solution cyborgs, best in class, comfortable towards the appliance position, conscious of the necessity of good data management. The role of the MDE then is in validation and in exposition with the Supervisor - not only does the institution "know" what it needs to know but perhaps even more crucially these days, it can prove that it knows. In this context, there is a role for both a classically closed source, appliance model, Siag and FRS Global alongside classically Open Source MDE like a REvolution environment or a Spotfire installation. If we are to enable transparency capabilities in large financial institutions sufficient to 'plug in' to a well regulated exchange trading future, at an instrument level, then MDEs do not fit closely with that universe, do they? It's the appliance model which fits that on-demand, publish/subscribe-type "Supervisory" world.

¹ <http://revolutionanalytics.com/>

² <http://www.siag.es/present.asp>

³ <http://www.frsglobal.com/>

It looks like avoiding or delaying or constraining propositions from Basel is not the coolest of things to do anymore. Optimized Transparency is a concept which if you haven't yet got you soon will! Neither Europe nor the US can meet the 'demand for money' of society without a wholesale credit market which channels savings directly from surplus institutions to credit (banking) institutions and leaves the equity market to do its job with risk capital. You can't play in the landscape of 2015-banking where everything is DIY and Exchange Traded unless your Mixed MDE/appliance model is fully up to scratch because full transparency entails that you have to be prepared to disclose those difficult numbers, even at an instrument level, effectively 'on-demand'. Fully transparency-capable financial institutions are going to be the winners in the future, that's the value proposition hurdle concept.



CONTEXT

Given the transparency ethos of life going forward, there is no logic which I can think to counter the proposition that the Solution Landscape, in the new Risk Management or Transparency world, will have to be one of defined coexistence. Classic (academic, even) 'Open Source' coupled to classic proprietary appliance and near-appliance "cyborg" type software applications, is the landscape of the future. The appliance meets the complex quantitative requirements precisely, is warranted to do that, with tacit approval from the supervisory authorities (the only kind you can get) since the published standard is precisely met. However, one data set which will never be outsourced or sent to the cloud is the risk management and transparency numbers. Handing that data set to one single vendor is placing the bank as hostage to fortune. The Bank itself has to manage its key Information Architecture (what we used to call DWH [Data Warehouse]). But an integrated Model Development Environment (MDE) with competent personnel to articulate what it can do is a sine qua non for the Bank of the future. It doesn't have to be huge but it fulfills the validation function and allows compliance with ad hoc stress testing needs. Thus I envisage a mixed "Transparency" platform integrated through the information management warehouse, both types of application extracting information where even the extract requests can be described themselves as large scale and complex. Crucially On-Demand, always available, is the non functional requirement of both types of application. This is in effect a star schema model applications architecture around the central large and complex data set management hub.

So what are the business requirements driving each type of application in Banking risk Management? In other words, what are the next pressures on data and applications architecture in Banking, particularly as concerns the large and complex data sets at the heart of Banks Transparency initiatives?

RISK MANAGEMENT

The point of risk management is that it is essentially idiosyncratic but you have to understand it to see that. Idiosyncrasy is not just an inevitable by-product of differentiation; it is the essential driver of business value in the financial services brand. It is that very idiosyncrasy (deviation from the norm, uniqueness) which the supervisor and regulator are trying to capture when he is monitoring the financial institution. They (the supervisor & regulator) are trying to regulate your uniqueness away and you are trying to innovate yourself beyond them; there is a time lag of indeterminate length during which you can cash-in super normal profits until the regulator (and the rest of the market) catches up with your latest innovation. That is the clean cool cycle of innovation in a free market, it doesn't have to be 'perfect' like the models assume, it just has to be unencumbered to use Smith's ⁴ phrase by moral delinquents and conscious predatory behavior. Not only do we have to proscribe such behavior, we also have to configure financial markets so that such hounds don't get the opportunity again.

The irony is that the now slimmed down banks will have to do relatively much heavier transparency analysis and reporting i.e. when all budgets are

falling with the size of the bank the only rising demand for spend is in computing power to meet the transparency requirements of the new age. There is only one way to supervise properly and that is to outsource the number crunching back to the banks themselves. I know a number of senior executives in European Banks who get it, full blown transparency to standards is an inevitability.

Although we had to accept the occurrence of the nutty UBS "angry shareholders 'Verein'" at their April 2010 AGM threatening civil actions due to the USD 37bn write-downs in 2007 – 2008. We must not forget that UBS have led the way on transparency and disclosure since the crisis⁵ with RBS doing a grand job a bit of a way behind, I could go ON! Great strides have been made in these difficult recent times but it (the elephant in the room, 'transparency') is not going away and is only going to intensify as market discipline operationalizes whatever the supervisory standard is. For too long it has been about conference calls between offices in CW and teams somewhere west on the Thames; "don't comply with the reporting requirement, just because you can, that means we all have to do it". That was the way it was in the Basel process pre-Crisis. Thankfully it is not like that anymore, because there are journalists and politicians, the public, peering into the dealing rooms!

FAILURE The scope to make hysterical and possibly slanderous remarks is certainly there in regard to the banks getting capital requirements estimates (the inverse of loss estimates)

⁴ http://en.wikipedia.org/wiki/The_Wealth_of_Nations

⁵ <http://www.asymptotix.eu/content/ubs-transparency-financial-reporting-setting-standard>

so massively wrong in the last two years. You can't afford to get your capital estimates wrong, it's an error which is potentially terminal not only for you but for your bank. However, Bank Management has been reorganized in the last two years such that the people in charge today bear no resemblance to the lot that ran us into the buffers (sic). There has been "regime shift". The old lot were hanging around on the sidelines of the pitch rubbing tearful eyes complaining that statistics was "just too hard" for them. Basel II made it crystal clear that they had to participate in a modern supervisory framework which required banks to conduct internal stress testing to quantify economic capital which supervisors would review and agree. They did not do it. It's now up to the new lot! YOUR GENERATION!

SOLUTION

Recently I have come to understand that the banking industry cannot practically implement MDE all over the place. There are just not sufficient quants on the supply side of the equation to manage and implement full blown MDE to address the requirement. Therefore, the banking industry requires to purchase, implement and integrate packaged solutions to each of the sub requirements (e.g. Liquidity Risk or VaR). In my view, unless a bank wants to hand over all of its information processing to a single vendor then there is no choice but to consider integrating 'best of breed' applications to meet this onslaught of transparency and governance requirements.

CONSTRAINING THE MDE WITH THE APPLIANCE

Give the MDE "particle accelerator" defined boundaries by surrounding it with High Performance compliance specific appliance style calculation engines. As soon as any quantitative analytic becomes standard for the supervisor, off load that from the MDE to the appliance environment. Monitor it. Treat the MDE with the respect you treat the interesting but threatening weirdo, with a pinch of salt but aware to the real nugget through the cloud of extraneous noise. The MDE is the "Differential Diagnosis"⁶ unit; that is what it's there for, the last place the most difficult patient gets taken to. Once a quantity becomes a standard there is no need to continually re-investigate whether it's the optimal one or not, the appliance model is the software engineering industry response to the march of Open Source, it defines the boundaries. The winners in closed source, are software engineers pure and simple; specify a precise requirement and they build precise solutions to the requirement which are millisecond fast if you want that, easy to use or as easy as these sometimes arcane standards allow: in short specifically fit for purpose, engineered to the highest software standards. That's what the Open Source guy does too & he can get genuine parallel high performance from REvolution Computing without building it all himself (its usually men, right?) But the package guys do it in teams, in Labs; they are on a mission to deploy IP, sometimes even with the package teams, the best demo is dot-prompt driven, using the CPU clock to count fractions of

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<http://www.fox.com/house/index.htm#home>



milliseconds. You only ever see that in Labs, really, the single handed open source hacker may twitter about it but when you meet the teams of software engineers behind a product who have often been in the same unit for tens of years then you know what the 'appliance' concept, in the Risk Management context, really means. A robot on the corner of the Information Warehouse computing the same numbers intra day and up the period scale as a service for the GL and CRO.

REQUIREMENTS

Effectively we already have the requirements model for Financial Predictive Analytics in Banking and Insurance, well specified in the supervisory and regulatory requirements, comprehensively articulated by the Bank for International Settlements and related Supervisory bodies and Central Banks so that we can move directly to the Design model. Senior Systems Analysts in Banks in the UK right now, know roughly what is coming down the pipe in terms of transparency requirements. They just don't know when. The business is still confused about the precise requirement definition because 1) its actually unclear in the UK who the supervisory authority is going to be & 2) Basel III is in QJS mode (already and again) which completely wastes the time of so much resource. If the politicians behave so badly specifically in regard to banking supervision, create such a fog of uncertainty, then blaming the bankers for everything is just so much hogwash (as usual) from them, each is as bad as the other. The point is that uncertainty more than anything pre-empts the put option, budget hoses remain shut under uncertainty and there is no chance of serious IT overhaul spend under that level of uncertainty.

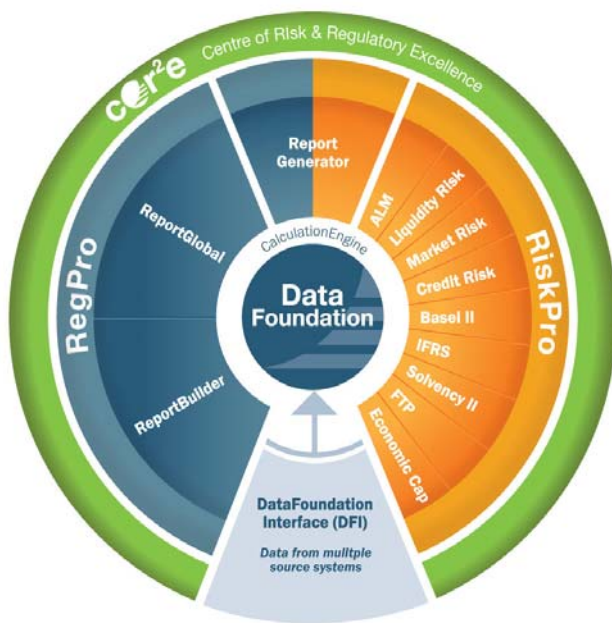
DATA GOVERNANCE FOR RISK MANAGEMENT⁷

Any decent bank has a variety of data management systems, methods, roles and responsibilities in place to make sure that data is stored, backed up, pushed around, recalculated, ETL-ed, dimensioned and reported on. What the current situation should have taught the supervisors and the bank's senior executives is that the financial ecosystem needs to move beyond data management and implement data governance. Where data management is about running the business of data, data governance is about making sure that it is run right.

In the complex information assembly lines that make up the bank's processing plants, we need to introduce measures and metrics to check whether the data that flows by is actually what it needs to be, and whether it corresponds to reality before it is pushed in a cyborg number cruncher that generates a risk exposure value. Because the overall ecosystem is so complex, it is the supervisor's responsibility to define standards that can be followed, and this in a way which goes beyond filling endless spreadsheets and text document with ambiguous descriptions. Despite the available regulations, too often do we hear cries for help: regulations are different, slight shifts in definitions, distortions of the same concept in different reports, no precise and harmonized definition exists, different interpretations exist per country, cross-border reporting is a real nightmare...

⁷ Stijn Christiaens, COO, Colibra

Data governance for risk management starts at the level of the supervisor. From there on, the standards are the interface to the individual financial institutions, who can implement their own data governance programs to ensure that everything is run the way it should run. Only in this way, can banks provide the numbers required to match them with their peers and sufficiently assess risk, and only in this way, can the supervisors make sure that the provided numbers mean exactly what they should mean. It is not easy, but the problem is not going away by not doing it. People need to be able to trust the figures again - all over the line: managers from different departments inside the bank, as well as anyone external to the bank.⁸



BEYOND THE CRISIS

The crisis will take two years after the World Cup to return to anything recognizable, that's partly why the supervisors cannot afford to screw up a second time; specify standards! If in the Long Run we are all dead then the Long Run is really something only Treasury Officials and Politicians have to wrestle with. In the Medium Term what can we expect in Banking Software? It looks like avoiding or delaying or constraining propositions from Basel is not the coolest of things to do anymore. Optimized Transparency is a concept which if you haven't got it already, you soon will.

The GLASS_STEAGALL_VOLCKER proposition lets call it, which is actually pre-big bang City of London in a way is coming in some shape or form. But this time the split by "Risk Appetite"/Capital Strategy will not mean that the more Risk oriented institutions will be allowed to remain opaque. We have learned particularly through the role of Paulson that unregulated opaque capital is like a cancer in the financial system. But splitting the financial institutions into 'Risk Intense' and Utility and permitting them to operate on the old German Pfandbriefe model but with Exchange Trading of Everything and total scrutiny of the securities which Utility and Risk institutions trade, is the right business model to enable scrutiny and 'transparency' which is now a social and political demand and now seems wholly reasonable.

⁸ <http://www.collibra.com/>

EXCHANGE TRADED EVERYTHING (ETE)

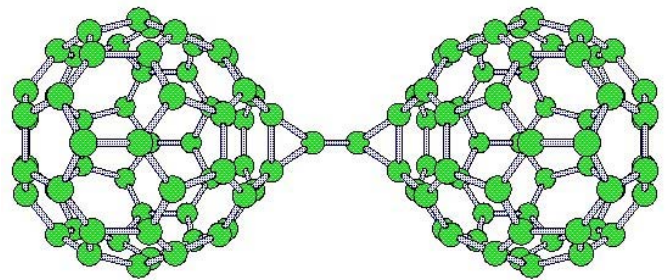
But it's not supervisory enforcement which will drive towards implementation of this kind of Solution Architecture alone; there is a business driver and that is the re-opening of the wholesale credit markets. Neither Europe nor the US can meet the 'demand for money' of society without a wholesale credit market which channels savings directly from surplus institutions to credit (banking) institutions and leaves the equity market to do its job with risk capital. What the ebb tide of the crisis has revealed is that the banking system simply does not have the "Balance Sheet Width", to supply credit if it cannot somehow channel its Mortgage Lending off balance sheet. It makes perfect sense to channel Mortgage Lending into a market; there is an underlying homogeneous product in the end. It's interesting is it not that the Senator Levin committee began the House Hearings, not only on Goldman but on the Mortgage Backed Securities business of Goldman Sachs? The US Federal Government has more invested today in getting the RMBS market re-started than Goldman ever had. Transparent Pricing in an Exchange is the answer to the problem.

A wholesale credit market will never again look like it used to do. It will require to have personnel with at least one eye on their stewardship role to manage it and the manifestation of that stewardship, the 'disclosure' of Stress Testing engines which compute forward looking 'economic' quantities of risk will be fundamental in a 'disclose everything' / trade anywhere future. In Europe, if they ever get it together, it will probably be along the lines of the Exchange Traded approach. By definition, Transparent as a result of Standards.

I will call this concept ETE "Exchange Traded Everything".

The main problem in Europe, of course, is that none of the banks in the small countries, Belgium, Holland have any banking capital left, if you estimated a haircut for Risky and Utility capital in Benelux/NL it would be a thin slice on the risky side.

But that is no reason that an Exchange Traded, transparent Mortgage Backed Securities market should not be established in Europe. We have learned through the Greek Tragedy, that the European Commission will always constrain to prudent limits the authority of the ECB. The issues in Greece are telling all Europeans including the British that we all see the need for radical transformation towards complete transparency. The question is do we trust the politicians? And how far can they influence the European Commission. They have taken long enough pontificating! Both the UK authorities & the Commission should get on and make clear what the requirements of the new banking world will really be and should just push ahead with their respective banking legislation, particularly if such legislation will cause corporate transformation.



THE POST CREDIT RATING AGENCY (CRA) LANDSCAPE

As I complete this paper, it becomes more and more clear that the CRA's (Credit Rating Agencies) have lost all credibility, certainly in European Sovereign Markets. They are in the sights of Senator Levin's Homeland Security Committee which just hacked Goldman Sachs to an apotheosis of reputation. The inherent conflict of interest of the CRA is well defined in credible academic research. Now there are accusations that conflict of interest manifested itself extremely badly, particularly in the economically key Mortgage Backed Securities markets. Obviously the EU at least has to consider now legislating the CRAs progressively out of existence. The problem is what do you replace them with?

INTERNAL RATINGS

I suggested last year that there was a hint in the European Commission perspective (Barroso One, as it is called) that an Open Source approach to 'Internal Ratings' requirements might be sensible⁹, i.e. define the algorithm precisely at a rules level & let the software engineers get on with it. Doing that immediately would obviate the need for the CRA's and their dark art, methodologically abstruse proprietary (and 'shady') models, at a stroke. There is no question that the Banks could meet this requirement if it was clearly spelt out to them. After all the strictly DIY approach to Internal Ratings (IR) is the spirit of Basel III. Any CXO in a bank or

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<http://www.asymptotix.eu/content/europea-n-union-legislating-ratings-process-towards-open-source-model>

asset manager you meet always has the same mantra - 'regulatory reporting (read:transparency) is not to be the total focus of all the bank's resources'!

So a value proposition which demonstrates business benefit for transparency is necessary as a premise for investment. Fully transparency-capable financial institutions are going to be the winners in the future, that's the value proposition hurdle concept. The Banking landscape of the future is going to be all about Transparent 'Internal Ratings'-driven standard operating procedures. External Ratings have an inherent conflict of interest, internal ratings have to be the basis of continuing markets in securities & banking. In effect the decline of the CRAs is the 'Tails' side of the same coin as the further promulgation of the Exchange Traded Everything (ETE) idea. It looks as though the US senate have accepted that proposition in specific regard to Mortgage Backed Securities Derivatives. All the noises post Greece from the EU institutions is act decisively on all the Securities Markets and Banking stuff; the ETE idea was first defined in a Brussels chamber. So, it's the thin end of the wedge, is it not? We are moving to a post CRA landscape where IR is king & it's an ETE environment. Isn't the business value proposition clear? You can't play in a post-CRA landscape where everything is IR unless your IR is fully up to scratch because full transparency entails ETE & you have to be prepared to make IR public to join an exchange.



CONCLUSION

If we are to enable transparency capabilities in large financial institutions to 'plug in' to a well regulated exchange trading future, at an instrument level, then (Model Development Environments) MDE do not fit closely with that universe, do they? It's the appliance model which fits that on-demand, publish/subscribe-type world. If not archetypal appliances then highly engineered application package point solutions are the route to that kind of transparency. Standard numbers if not intra-day then EoD¹⁰, instrument level (translate that to your semantic as you like), aggregated and blended with other macro data sets to support MDE validation and further outlook i.e. Stress Testing. But crucially numbers going outside the door at instrument level on a daily basis in a context where it looks as if the different regulatory bodies are going to be told to stop squabbling. The only way to meet the core BAU aspect of that requirement is the appliance with the MDE in the assurance role, in my view.



ABSTRACT

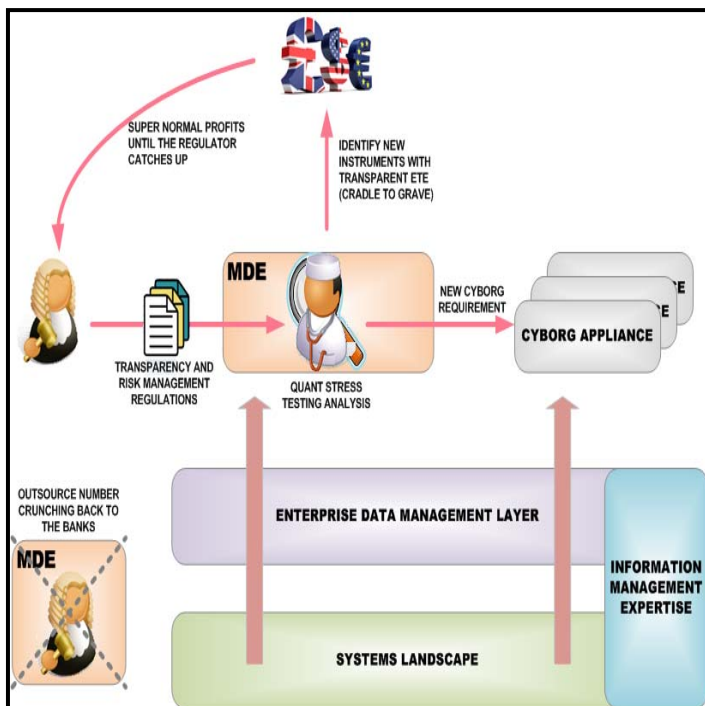
This paper leaves the Large and Complex Data Set as the silent elephant in the room. Instead, it looks along a differential perspective at the nature of the end-client of the Large and Complex Data Set. I want to look at the key Large and Complex Data set (as an abstract) in the real world today; the Data Warehouse in a Financial Institution. Basic Economics tells you that the data warehouse (or whatever it may be called today) is a supply partner to the client applications which demand its data. In the real world in Risk Management in Financial Institutions, these client applications are for the most part either appliance model or Model Development Environments. These are the applications which actually consume extractions of information from massive data sets. This paper is an examination of the context and management of these two types of Complex Data Set clients in the real world of banking as we know it today. I provide a further examination of the demands being placed on the client layer for the Complex Data Set. Consequently I can depict a supply chain of data management requirements in banking today. Finally, I draw some conclusions about the future of the large and complex data set, in banking and securities industries.

¹⁰ "End of Day"; UCP

The salient point is that the real constraint on future transparency in banking, the limit of the validity of the best concepts of transparency, is technology. Banking Transparency is the genuinely scary, very large scale complex data set management problem of our time. It could be and to some extent is being strongly argued that there is an overwhelming political need to get it done, both in the US and Europe. But is it a social externality? Maybe not yet but it is heading that way. In that context all experts in the 'Large and Complex Data Set' field should have an interest and role in solving this problem.

The key concepts which require to be addressed are; 1) Large and Complex Data Sets, 2) Extractions of information from massive data sets & 3) Illustration of how the extraction of information from large and complex data sets is of critical concern to an end-user. This paper does that in the context of the Credit Crisis. I do that by zooming in on the underlying technical aspects of the paper. The key issue I want to share is in the questions surrounding true transparency in Banking and Financial Markets. As I have said, Banking Transparency is a genuinely scary very large scale complex data set management problem of our time. It could be strongly argued that there is an overwhelming political need to get it done, both in the US and Europe. The question is; "is it a social externality" i.e. is it such a challenge that it is 'beyond' the private sector market system to solve and is it such an important social need that the state in both the US and Europe is required to step in and support the development of demonstrably transparent data management in Banking and Financial Services more widely?

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¹¹ Tim Franklin, IPL

PEER GROUP REVIEW

This paper has been circulated for peer-group review to a wide group of academic, IT & risk experts. Not all contributing reviewers wish to be cited, nevertheless I am genuinely grateful to those who took the time to edit and debate the content. Thanks to the following;-



Mark Piper
VP MEA, FRS Global



David R Bristow
International Director, Siag



Tim Franklin
Principal Consultant, IPL



Markus Krebsz, Consultant, Rating Agency Expert

Author of 'Securitisation and Structured Finance post Credit Crunch'

Stijn Christiaens, COO, Collibra



John Moe
Head of Integration Services
TORI Global



AUTHOR

J A MORRISON

DIRECTOR, SOLUTION
PARTNERSHIPS
ASYMPTOTIX SA

Brussels
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www.asymptotix.eu

