Cognizant

MiFID
- White Paper

Cognizant Technology Solutions

Contents

Last Updated: NOV 2005

Introduction

The Market in Financial Instruments Directive (MiFID) that is due to come into effect in April 2007, aims to build a single, seamless financial services market in the European Union and would perhaps be the most far reaching financial reform ever undertaken. MiFID seeks to uphold the integrity and overall efficiency of the financial system and provide a coherent, risk-sensitive framework for regulating the order execution arrangements in the European financial markets.

The impact of MiFID would vary between firms, lines of businesses within firms and member states within the European Union and beyond. Certain articles in the Directive mainly impact equities as an asset class where as other articles cover virtually all financial instruments.

MiFID would herald a new structure for the European financial markets with a far more fragmented market leading to a considerable loss of monopoly that the regulated exchanges[1] currently enjoy. MiFID would also usher in increased revenue opportunities for players that are not regulated exchanges. MiFID would fundamentally affect the way investment advice is currently handled and the way transactions are executed besides a substantial increase in regulatory reporting requirements. Identification, efficient usage and deployment of technology would be the critical success factor for any firm.

The key challenges would comprise data aggregation and dissemination, reference data management and handling data exchange requirements with appropriate standards.

With 30th April, 2007 being the deadline when MiFID will come into effect, preliminary estimates reveal around 1 to 1.5 billion EURO spend for the industry between 2006 – 2008 for achieving MiFID compliance. In the long run, this would bring in substantial cost savings owing to increased efficiencies and revenue opportunities that open up due to MiFID implementation.

This approach note attempts to capture the impact on players to be affected by MiFID with a special focus on Investment Firms[2]. The note attempts to give the reader a sense of the key Business and IT implications MiFID holds with a possible methodology for implementing the changes ushered in by the Directive.

Business Implications

Key Directives

Figure 1 below best describes key Directives of MiFID with the sections below capturing business implications of these Directives on the 3 key stake holders in this space – Investors, Investment Firms and Trade venues (Regulated exchanges / MTFs[3])

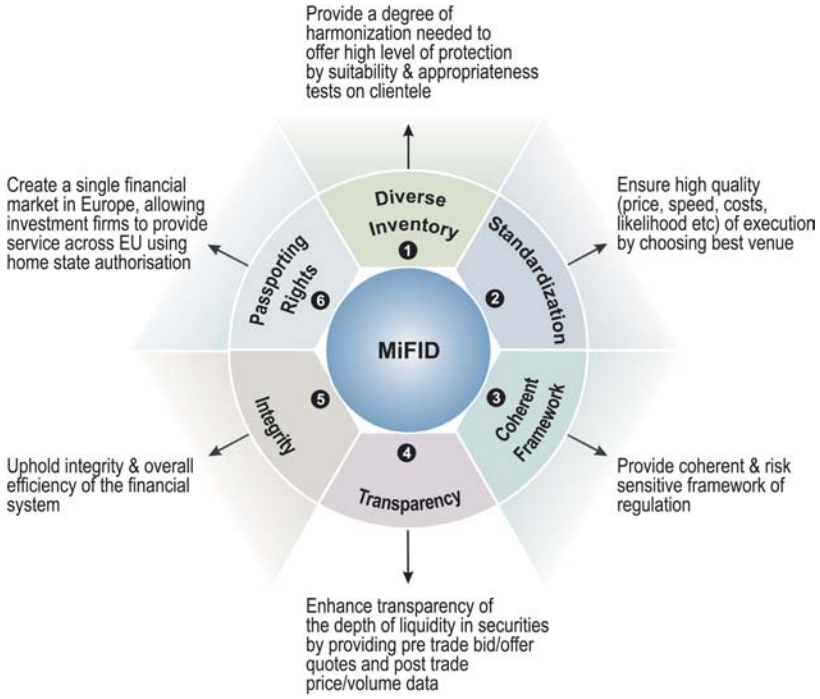

FIGURE 1 : Key Directives

[1] *A market in which financial instruments are traded in accordance with rules/guidelines and supervision from the regulator*

[2] *Any legal person/entity whose regular occupation or business is the provision of one or more investment services to third parties and/or the performance of one or more investment activities on a professional basis*

Impact on Stakeholders

MiFID would impact a wide range of stakeholders across the value chain in the European Financial Services Industry: Investors to Investment Firms; Regulated Exchanges to Alternative Trade Venues. Ensuring best execution and transparency would result in significant changes in the securities markets structure. This would lead to increased competition with reduced margins with the ultimate beneficiary being the Investor. Figure 2 below tries to capture the impact MiFID would have on key stakeholders.

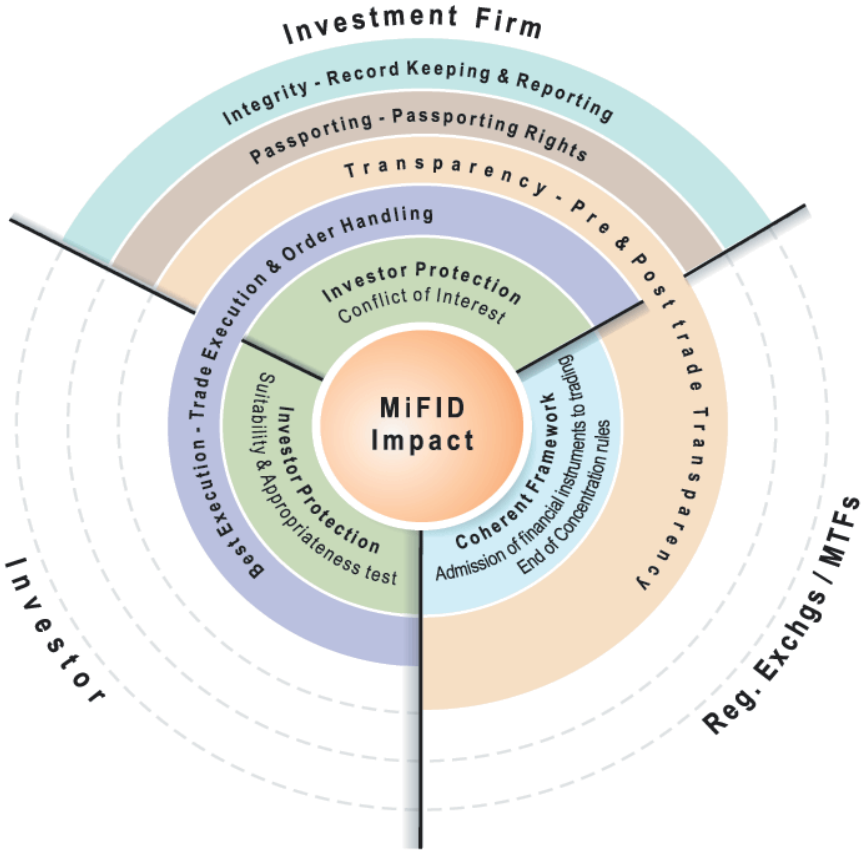

FIGURE 2 : Impact on Stakeholders

While Figure 1 explains the Key MiFID directives, Figure 2 above goes further to capture the effect of key articles within each directive on each of the key stake holders viz. Investors, Investment Firms & Regulated Exchanges / MTFs. Some of the Directives impact multiple stakeholders in different ways. This is captured through an overlap across stakeholders such as Best Execution directives that would affect Investors as well as Investment Firms, Transparency guidelines that would affect Investment firms and Regulated Exchanges / MTFs and Investor Protection guidelines that would affect Investors as well as Investment Firms.

MiFID will create need for tools to support Data Management and allow transparency. Storing, sorting, sharing, collecting securing data will become key in MiFID compliance. Existing IT applications need to be upgraded in order to meet up with these requirements.

Investors

Investor Protection

Protecting the interests of investors is one of the central themes of MiFID. Almost all the provisions are based around this premise. Some of the main articles which propound safeguarding investor's interests are:

Suitability Test: (Article 19(4))

An Investment Firm would have to extract minimum necessary information to assess investor suitability. The focus is on obtaining information pertaining to client's profile, knowledge and experience in the relevant product/service and field of investments in general. Exhaustiveness and depth to which information needs to be sought is also dependent upon the kind of service being provided/ sought for; appropriately portfolio management would demand greater depth as compared to mere advisory service.

[3] *A multilateral system, operated by an investment firm or a market operator, which brings together multiple third-party buying and selling interests in financial instruments – in the system and in accordance with its discretionary rules*

Appropriateness Test: (Article 19(5))

Based on the information received pertaining to knowledge and experience, prospective clients need to be classified into various categories; mainly retail and professional clients. This should serve as the basis for evaluating if a certain product/service is appropriate for the client. The criteria need to be consistent considering its implications on customer-centricity and profitability on one hand and it falling under ambit of regulation on the other.

Best Execution

Best execution is another key MiFID Directive that would lead the investment firms to restructure their order execution policies (and share the same with the regulatory authorities as well as clients) to ensure best possible routing and execution of client orders. This would become a point of differentiation for such firms and would lead to increased competition among firms ensuring best value for clientele (investors).Firms would necessarily have to justify the choice of the venue for the execution of contracts and would have to substantiate them with adequate reporting. Some of the key articles from this are:

Trade Execution: (Article 21)

The Investment Firm is responsible to ensure that the deal is executed on terms most favourable for the client. Best Execution is not just restricted to the price but also includes cost, speed, likelihood of execution, size, nature etc. This would force an Investment firm to come up with business rules and execution policies to be applied in every execution. They would need to scan all possible trade venues for the best deal.

Order Handling (Article 22)

All the orders placed by client need to be executed promptly, fairly and expeditiously. The procedures or arrangements implemented shall allow for the execution of otherwise comparable client orders in accordance with the time of their reception by the investment firm. This is also applicable for a client limit order which is not immediately executed under prevailing market conditions, Investment Firms are, unless the client expressly instructs otherwise, to take measures to facilitate the earliest possible execution of that order by making public immediately that client limit order in a manner which is easily accessible to other market participants.

Investment Firms

For an Investment firm, MiFID brings a mixed bag of surprises; gives flexibility to expand business/services across the European Union on one hand but imposes certain obligations forcing them to spend significant amount of resources in upgrading systems/processes for compliance on the other. Directives on Passporting Rights, Transparency, Integrity and Investor Protection open up new business opportunities for Investment firms with obligations for disclosure at the same time. Investment firms that are brokerage houses as well would find the need to consider a more consultative role as the brokerage functions becomes more obsolete with MiFID. Investor Protection guidelines would mean that companies will have to go back to their clients and put agreements in place. When agreements already exist, they will need to be re-examined. This will also mean more legal work and legal costs. Figure 3 below best depicts the high level business impact of MiFID on an investment firm and how are they positioned to actually leverage the opportunities MiFID throws up.

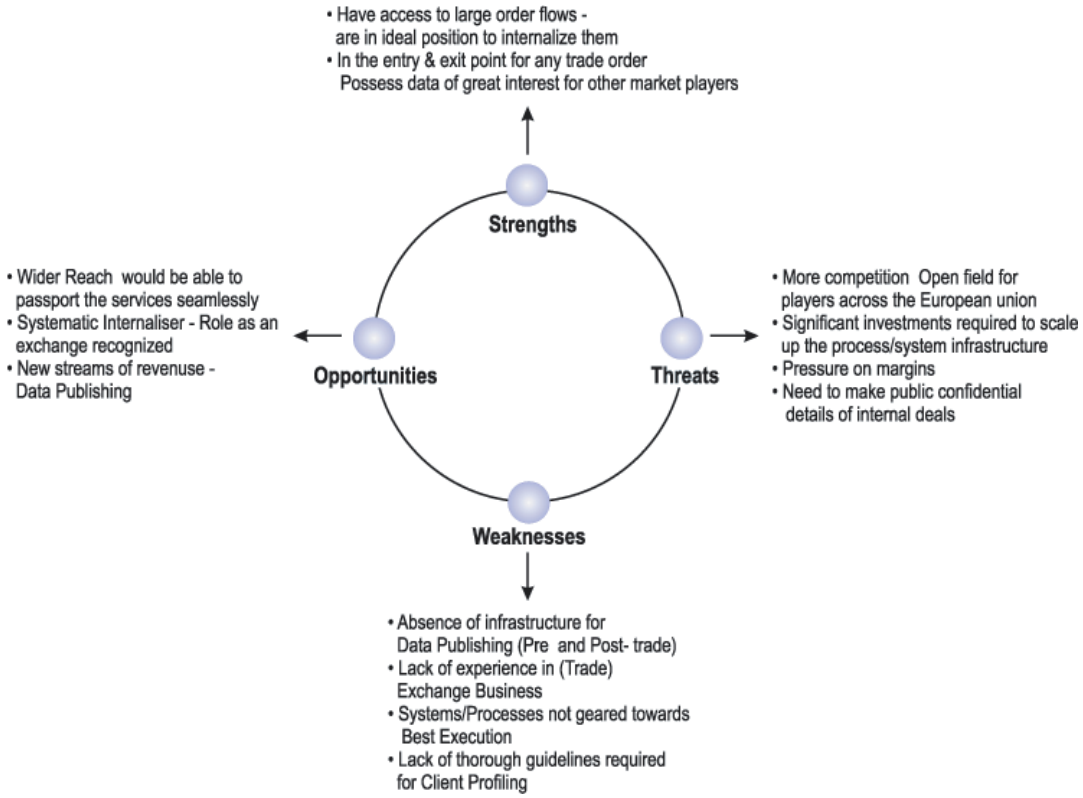

FIGURE 3 : High Level SWOT analysis - Investment Firm

Passporting Rights (Articles 31,32,33,34)

Investment Firms have been given freedom to provide investment services and activities across the entire European Union. This essentially is extension of concept of Passporting making the whole European Union a single seamless financial market. They could easily establish branches in other territories within the union (based on home state authorization) and also gain access to the regulated markets. Member States will have to ensure that investment firms from other member states have the right of access to central counterparty, clearing and settlement systems in their territory for the purposes of finalizing or arranging the finalization of transactions in financial instruments. This presents enormous business opportunities for the Investment firms with a level playing field being created throughout the European Union.

Transparency

New business opportunities for Investment firms come with obligations to ensure transparency and Integrity. Some of the key articles that are directed on these lines are:

Pre-Trade Transparency (Article 27)

Some of the Investment Firms engage in trading between their clients outside the regulated exchanges and are known as 'Systematic Internalisers[4]'. They too would now come under the purview of MiFID and therefore would have the opportunities and obligations as any other exchange.

Transparency (bid/offer price, size etc) for internally matched transactions within such Systematic Internalisers have to be made public especially for liquid stocks. Such quotes (below certain large volume transactions as specified by Article 27(1) of the MiFID Directive) have to be made public in regular and continuous basis such that it is easily accessible to other market participants. This presents opportunities for Systematic Internalisers and at the same time throws up enormous business challenges of providing firm quotes to the public.

Post-Trade Transparency (Article 28)

Information pertaining to transactions which have already happened i.e. price, volume, time etc has to be made public. For instance for 'Cross Orders', if a Systematic Internaliser matches the buy/sell order internally, it has make public the spread between the two as well. This information has to be published as close to real time as possible and in a manner that is accessible to other participants. The possible channels of making such information public would be Exchanges, MTFs, Data publishers or any other arrangement.

Integrity

Investment firms should be responsible for ensuring Integrity in the system by efficient record keeping and providing information to the relevant competent authority as and when required. This would impose lots of challenges in storage and retrieval for such records.

Record keeping and reporting (Article 25)

Investment firms have the responsibilities to store and make available records of all transactions in financial instruments for at least five years. All transactions should be timely reported to the competent authority with the reports including names of clients, quantity of instruments bought / sold along with dates and time of transactions.

Investor Protection

The individual investor acquires a central role in the MiFID Directive with his/her protection being paramount. Ensuring protection of investor interests would result in new business challenges for Investment firms.

Conflict of Interest (Article 18)

It is the responsibility of the Investment Firm to identify potential areas of conflict between themselves (including manager, employees, or any other person directly/indirectly linked with them) and their clients. They should take all possible steps to minimize them as much as possible and clearly disclose the general natures and sources of conflicts of interest to the client before undertaking business on its behalf.

Regulated Exchanges / Multilateral Trading Facilities

Trade venues (stock exchanges and alternative trading facilities) are likely to get significantly affected with MiFID as a lot of new venues will come under purview of regulation leading to increased competition and end of 'Concentration Rule[5]' as prevailing in certain parts of the union. Alternative trading venues (Multilateral Trading Facilities etc) would assume equal importance and would get connected through networks thereby proving to be huge competitors for existing regulated exchanges.

Transparency norms are unlikely to have major impacts on Regulated exchanges which already adhere to such guidelines. Multilateral Trading facilities are bound to have major impact with such norms on transparency and disclosure. Concentration rules ending with MiFID compliance, MTFs and Systematic Internalisers can seize substantial business opportunities as a market data distributor rather than take head on regulated exchanges for seizing order flows. While the barrier to enter as an MTF was low previously, pre/post trade transparency norms would make it more expensive for an MTF to enter and remain in the game.

Coherent Framework

MiFID aims to provide a coherent and efficient framework for all players to ensure overall efficiency and compliance.

Admission of Financial Instruments to Trading (Article 40)

Trade Venues need to come out with clear and transparent rules regarding the admission of financial instruments as well as they being traded in fair, orderly and efficient manner. Once a transferable security has been admitted to trading on a regulated market, it could subsequently be admitted on any other market as well.

Concentration rules (Article 69)

Concentration rules that ensure (Particularly in France, Italy and Spain) orders being routed to national exchanges would cease to exist with MiFID. This would provide Investment firms with opportunities to tie up with alternate trading venues to provide the best deal for investors.

[4] *An Investment firm which, on an organised, frequent and systematic basis, deals on own account by executing client orders outside a regulated market or an MTF*

[5] *A rule effectively forcing all instruments trading through a local regulated exchange, and post-trade clearing and settlement through favoured national market depositories.*

IT Implications

Impact on Systems/Processes

Most of the mandates put forward by MiFID are based around efficient execution, transparency/integrity and conduct. Existing systems as well as business processes would need to be analyzed, re-engineered, upgraded or even replaced in some cases to meet requirements along these key mandates.

Investor Protection

Systems that hold Customer information would need to be upgraded to ensure the stringent standards of Suitability and Appropriateness are met. This could mean request and storage of additional information for potential clientele before accepting order flows from them.

Best Execution

Routing orders to ensure best possible value to investors would result in significant change in existing business logic for Order routing systems. This would mean that investment firms would need to establish order execution policies with exchanges / MTFs to get the best deal on trades. Appropriate systems for internal matching too must be created to ensure best deal for the clients. The need for a combined order book to check and compare situations in other markets is greater now. Firms would also have to undertake the burden of generating additional reporting to substantiate their best execution policies.

Coherent Framework

End of Concentration rules would mean that order routing systems would necessarily have to be significantly augmented to ensure business logic is present to route orders to the right venue to ensure best execution. This would impose great challenges in establishing systems with required business intelligence to perform these activities.

Transparency

Stringent requirements for pre and post trade transparency would impose severe challenges on investment firms (that act as systematic internalisers) and MTFs to create the need for systems that regularly publish quotes – pre and post trade. Further, channels would need to be established with market data providers to ensure that there is timely, continuous and reliable data coming out of all such market participants. An industry wide messaging standard that the data vendors and data publishers would have to adhere to would have to be agreed upon.

Integrity

Directives around this proposition would mean storage of customer trade records for a minimum of five years. The information to be held would be names of customers, prices, instruments involved, sizes of trades, time of execution etc. Not only storage, but timely retrieval and making available to competent authorities would impose significant challenges on storage and retrieval mechanisms.

Passporting Rights

Creation of a seamless pan European market would allow investment firms to set businesses in other European Union countries based on home state authorization. This would translate into a significant challenge for firms to ensure business logic is present in Order routing systems with a need for creating a Combined Order Book (across venues) to take alternate countries into account to ensure best execution along with a huge need for relevant infrastructure to be created to ensure market connectivity between alternate venues.

Possible Solutions

Certain rule-engines, data/message standards and architectures will elicit more interest compared to others as they are better equipped to meet up with the impending challenges.

- Algorithmic systems analyze price and trade data and generate trading in line with the rules of the selected algorithms could be well placed to handle the complex business logic that would emanate from ensuring Best execution requirements
- Reference data implementations would attract significant limelight as a result of increase in data on investors, venues, instruments.
- Ensuring adherence to common messaging standards would be critical to manage exchanges of huge volumes of data with different trading partners / entities. The FIX protocol[6] may be best suited to tackle this.
- Service Oriented Architectures could be best suited to handle stringent requirements MiFID imposes while offering flexibility for reuse with changing legislations

Impact on IT Infrastructure

MiFID implementation would require widespread changes to the IT infrastructure landscape to satisfy key mandates of the Directive.

Network Infrastructure

MiFID mandates would need network infrastructure and communication lines to be upgraded to ensure best execution (in terms of responsiveness) and transparency (in terms of delivering live quotes) are met. Connectivity infrastructure would have to be enhanced to enable acceptance of feeds from multiple sources. A common messaging standard would have to be arrived at to take care of the new business rules, new data elements in the feeds. While arriving at a common standard, practical considerations such as message volumes, increased complexity due to best execution requirements, message consolidation requirements and protocol management would have to be borne in mind.

Storage Infrastructure

If Data storage Directives (Historical customer data for as many as 5 years) have to be met, the data storage infrastructure would have to be ramped up significantly. Also increased trading venues and consequent increased data exchange mechanisms coming into play, storage infrastructure

would play a key role in ensure redundancies are met. Apart from data storage, retrieval mechanisms would have to be put in place to ensure timely retrieval when required by the competent authority.

[6] *Financial Information eXchange (FIX) Protocol*

Functional View

This section of the note captures typical activities in an investment firm and tires to elaborate diagrammatically how MiFID would impact each of them.

Figure 4 below depicts the key functions along with related systems/sub systems that participate in the business processes for a typical Investment Firm. The systems / sub systems have been split across silos such as Front Office, Middle Office, Back Office and Analytics that are typical to any Investment Firm. Figure 4 seeks to showcase the range of the impact MiFID would bring across the portfolio of systems/sub systems in the firm. Key Articles from the Directive that would bring in changes have been mapped against each system / sub system.

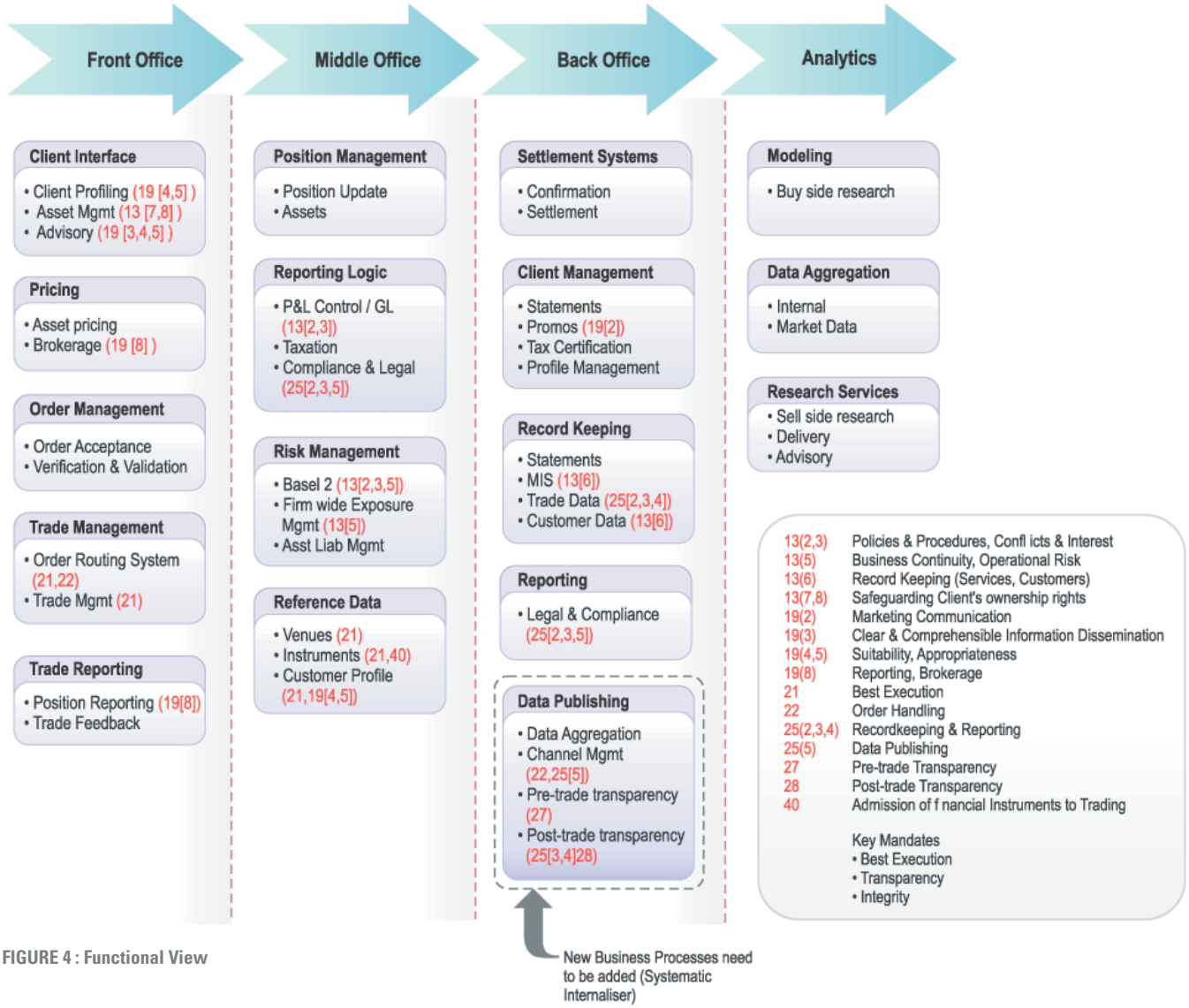

FIGURE 4 : Functional View

Data publishing would pose a critical challenge and can turn out to be a completely new business process for players such as Systematic Internalisers owing to the Transparency directives.

Cognizant Methodology

The deadline for MiFID readiness being 30th April, 2007, planning and implementations would have to occur through 2006 with finalisations and certification being achieved in 2007.

Based on past experience with compliance legislations, such as Basel II, Cognizant advocates a four phase approach for MiFID compliance, with each phase building upon the previous one.

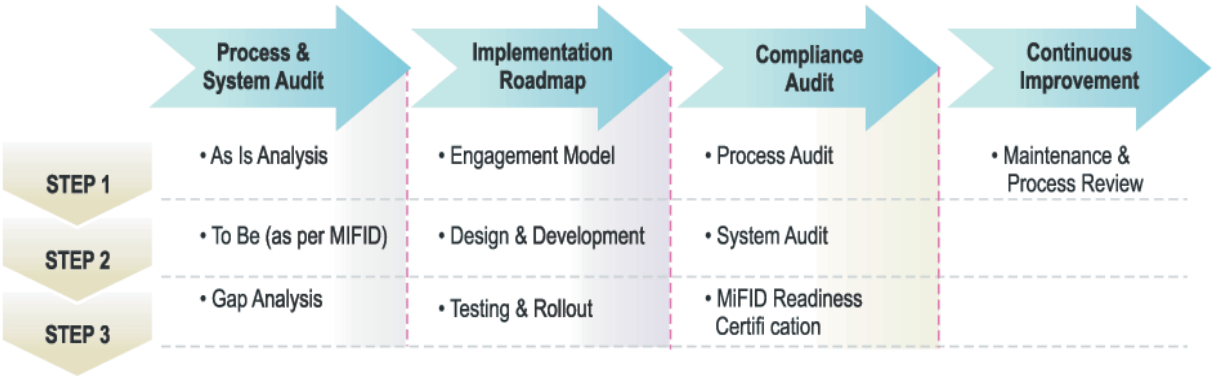

FIGURE 5 : Cognizant Methodology

Phase 1: Process & System Audit

Step1 - 'As Is' Analysis

A team of consultants (domain and technical experts) from Cognizant would assess the existing portfolio of processes & systems along the value chain. The objective of the exercise would be to get a comprehensive view of current state of preparedness to meet up with the new requirements.

Step2 - 'To Be' Analysis

The objective of this step is based on the as-is understanding, design the 'to-be' processes as required by MiFID as well as capture which systems should be modified / put in place to enable these processes.

Step3 - Gap Analysis

Processes and hence systems which are going to get affected significantly with MiFID need to be aggregated in an inventory. Based on the "To be" analysis, a report on the systems that need to be upgraded to move from the "As Is" state to the "To Be" stage would be prepared. An upgrade could mean enhancements / modifications in the system or could even go to the extent of complete replacement with a different application / product.

Phase 2: Implementation Roadmap

The implementation roadmap will be conceptualized and drawn up to address the gaps identified in phase I:

Step1 - Engagement Model

The objective of this step is to scope the compliance project. This includes identifying the resources, effort, systems etc. required for the MiFID compliance engagement. It would involve consideration of factors like costs (fixed vs. T&M), business model (build vs. buy) etc. Cognizant would provide leadership through a Project Management team through the course of the engagement.

Execution Team - Cognizant's execution team will consist of the following specialists. Some of them provide offshore consultation to the key member(s) at the client site.

- Project Manager
- Domain Experts (Banking, Securities and Capital Markets)
- Technical Solution Architects
- Reference Data Specialists
- Networking and Infrastructure facilitators
- DW & BI Tool specialists

(* Team composition mentioned above is only indicative and may vary with the scope of the study and complexity of the environment. Actual team and project duration is crystallized during the initial Project Planning & Scoping stage in consultation with the client team.)

Step2 - Design and Development

The affected application(s) would be modified / enhanced as per detailed functional requirements drawn out of discussion with Client business experts. The detailed functional requirements lead to the phases of design and development. Cognizant's business analysts with sufficient domain experience would be best equipped to handle detailing of such requirements. Cognizant can provide technical consultation services in the Design phase while drawing up the overall architecture for the affected systems.

There are certain key challenges in this phase (at this point in time) viz.

- The European Parliament has not yet passed the Directive. Getting into an implementation without caution could mean a lot of rework if elements of the Directive change
- A forum for discussion would need to be established to ensure that the design and development standards adopted by one firm meet the requirements of all other partners without which exchange of data would be a failure.

Step3 - Testing & Rollout

Application Changes would be extensively tested using internal and external data to ensure reliability. Scheduling would have to be done with external partners such as exchanges, other trading partners, data publishers etc. Scheduling this testing would be critical to the success of the roll out

- System / Regression / Performance testing
- User acceptance testing
- Implementation (phased) at key locations
- Rollout – to all locations of organization

Phase 3: Compliance Audit

Step1 - Process Audit

This is a crucial step to confirm the modifications/up gradations done are in sync with what was originally contemplated and MiFID regulations in general. This is more of responsibility of the client to nod the confirmation and also assess how efficient, smooth and robust new/modified processes are.

Step2 - System Audit

A team of experts from Cognizant would audit and evaluate the application/systems which have been affected in the process of getting individual processes compliant to MiFID requirements. The applications/ systems should be up and running meeting all the functional and non-functional requirements imposed upon them.

Step3 - MiFID Readiness Certification

With this step Client is standing one step away from MiFID compliance, a third-party independent auditor needs to assess the entire gamut of systems/processes against the regulation and certify the same. Regulators need to be notified of client's readiness which may further carry out the inspection before attesting it MiFID compliant.

Phase 4 : Continuous Improvement

In an effort to continuously improve on the implementations, Cognizant can provide maintenance services using a dedicated team with varying levels of support and SLAs that are agreed upon through a maintenance contract.

Cognizant Experience &Benefits

Strong Domain Focus: Cognizant has strong banking domain focus with team of domain consultants and technology specialists. Cognizant has been in the forefront offering leading-edge technology solutions for solving business challenges. With combined strength of 5000+ associates in banking domain, Cognizant has expertise and experience in the areas of portfolio management, brokerage, asset management, custody, clearing and settlement, wealth management, risk management, stock exchanges, retail banking, cards processing, payment solutions, customer interfacing, commercial lending and investment banking

Technology Bandwidth: Cognizant's experience across various technologies and platforms has helped it to consolidate it's presence with large financial institutions, where Cognizant is involved in application management across platforms and technologies such as mainframe, midrange, workstation, networks and Internet, in projects varying from legacy to web-integration.

Reference Data expertise: Cognizant has a reference data point solution framework, backed by a dedicated reference data competency centre, with members drawn from both the banking and IT sectors. The solutions has a phased approach designed to assist organizations in their Reference Data Management initiative-an approach that encompasses the appropriation, collation, mapping, cleansing, storing and distribution of data with a carefully structured team from the competence centre, customer IS and user groups. From our experience, we have found that the medium-large sized banks prefer to custom develop the solution.

Cognizant then provides the solution by following the methodology of

- Map & Model: This involves building data models and integrating reference data from disparate sources (regardless of structure), and transforming it to standardized, consolidated enterprise-wide structures.
- Manage: This includes reporting and messaging services for an enterprise wide reporting system, and a comprehensive Security/Permissions model to control user access.
- Distribute: A highly scalable and extendable distribution solution catering to varying service levels of individual downstream systems, including heterogeneous replication for downstream distribution to systems across varied platforms.

Key Differentiators

1) Focus - With a 100% focus on business verticals, Cognizant works with large clients in core areas of systems software, engineering services, products, training and enabled services
2) Offshore Maturity - Cognizant's onsite-offshore mix percentage has been steady at a 15-30% onsite: 70-85% offshore average across all kinds of projects
3) Customer Responsiveness - Close interaction with clients, through the deployment of local relationship management / account management teams, who are empowered to make decisions for speedy resolution of issues.
4) Onsite-Offshore Delivery Model - Cognizant has a proven onsite - offshore project management model with clearly defined roles reporting structures and escalation mechanisms and the deployment of Client Partner and Account management teams. The USP of this model lies in concurrent execution out of onsite and offshore locations; this ensures a physical proximity to the client as well as a focused, scalable team at offshore.

Clientele: Cognizant is the preferred vendor partner with some of the largest banking and financial service companies to help them succeed in this challenge. Cognizant's client list includes names like JPMorgan Chase, Credit Suisse Financial Services, First Data Europe, ING, Citigroup, American Express, Bank One, MetLife, Royal & SunAlliance, Pacific Exchange, Philadelphia Stock Exchange, CSFB Direct, Charles Schwab, Providian Bank, PFPC, Bank of New York among others.

Case Studies

Case Study 1 – Basel II Compliance

Business Background

The client is an investment bank based in UK and is one of the largest global financial services groups in the world with a focus on financing and risk management. It acts as an intermediary and advisor to corporate, financial institutions, governments and supranational globally. Its key businesses include traded products such as bonds, equities, commodities etc., lending products such as loans and risk management products such as convertible bonds, derivatives, swaps etc.

Business need

The key drivers for the exercise were:

- Restructure the credit risk management system for overall compliance with Basel II accord.
- Redesign and revalidate all existing core credit models to satisfy Basel II.
- The need for 'single data architecture' for all credit risk information including credit capital calculations, credit models, stress testing and credit reporting.

Project Scope

Cognizant was engaged as a consultant with the objective of defining the central data infrastructure that would not only support the Basel II regulatory requirements but would also serve as a single source of data for all applications related to Finance, Regulatory Reporting and Risk Management within the organization. The scope of the engagement included

- Technical analysis to determine the feasibility of extending the existing transaction database to include transactional data for all banking book and trading book portfolio
- Architect a central Basel II Transaction Warehouse by extending the existing database or building a new Transaction Warehouse
- Design of interfaces across the new Basel II Credit Risk Architecture
- Identify key entities of the new Transaction Warehouse
- Identify candidate technologies for major components of the new Credit Risk Architecture

Cognizant's Solution

Cognizant conducted a 12-week consulting engagement comprising of the following phases:

- Business and Technology Analysis - to understand the current architecture and how it needs to change to support ongoing credit risk management. A System Analysis document was created defining the application landscape of the client.
- High Level Architecture Definition - which involved drilling down in major areas and create proposed future credit risk architecture. A system view document defining the high level system architecture and identifying the major gaps was provided in this phase
- Detailed Architecture Design - which involved making physical architecture decisions for major components and their interfaces. A Data Architecture Document defining the major data entities and the logical data model and a Technical Architecture document defining the major architectural decision points were provided.
- Prepare a Roadmap – to move from the current architecture to the future systems architecture

Business Benefits

- Definition of data structure that would meet the Basel II requirements of the client.
- The proposed data infrastructure would be the backbone on which the client could build their credit risk models and the regulatory reporting requirements for Basel II compliance.
- The single data infrastructure would provide a single source for transactional information as well information on PD/LGD/EAD and regulatory capital (Risk Weighted Assets) across the organization and would help minimize reconciliation errors between Regulatory Capital and Economic Capital as well Regulatory Capital and Risk.

Case Study 2 - Reference Data Consolidation

Business Background

The client is a top tier financial services provider based in the US and offers a wide variety of services in the areas of Investment Banking, Private Banking, Wholesale Banking and Retail Banking. Over the past many years, the client has grown exponentially both organically as well as with many mergers and acquisitions. This led to the acquisition of many different software systems with varied technologies performing similar functionality in the enterprise. Consequently, its reference data process has become fragmented, complex, redundant and inefficient.

Business need

Due to multiple systems, maintenance as well as consolidation of client information into a single global view has become increasingly difficult. Hence, a need for a system that would facilitate the process of consolidation and management of all client related information was felt.

Project Objective

Reference Data Consolidation system was conceptualized to be the authoritative source for wholesale party information within the firm and would include information regarding both active and prospective clients, parties acting in third party roles between the firm and its clients, vendors, and parties to support instrument reference data (e.g. issuer, exchanges, regulatory bodies).

Project Challenges

- Heavy Resource Ramp up and down. The peak resource strength for this engagement was 110 resources (Including Reference Data Distribution)
- Supporting projects were inter-twined
- Very large and intricate engagement with varied and complex technologies such as Rules Engine, MQ Workflow, Blaze Advisor
- One time data migration across both disparate Databases & Applications
- Reconciliation of data between source and subscriber system

Cognizant Solution

The Cognizant Solution has a three-tiered architecture with Java Swing based GUI as the front end. The server components would be deployed on IBM WebSphere. This architecture is intended to allow any of the three

tiers to be upgraded or replaced independently when requirements or technology change. It lends flexibility, scalability, portability and ease of maintenance to the business functionality of the systems developed using this approach.

The new system provides screens to setup new clients and also to manage client data. Apart from the user interface, the system also has the capability to accept and process client data coming from external interfaces (MQ Series, flat files, and XML messages). The Client's central data resides on an Oracle database.

The Business layer is built using Java and EJB components deployed on IBM WebSphere. The system includes an integrated Workflow component implemented using IBM MQ Workflow. The primary purpose of the workflow component is to drive client on-boarding (setup) and client reference data maintenance with appropriate verification, approvals and notifications as required.

The system also has a Rules engine to validate Business rules, perform Address and Client compliance validations. User access security is controlled using IBM Policy Director, and the application permission structure is based on three levels viz., Role, Function and Field level.

Business Benefits

The new system is the authoritative source for client information within the enterprise. This will eventually replace all the legacy systems currently managing client data. The benefits of the new system are the following:

- Automation & Accuracy: The new system enables automated integration of data between various applications and legacy systems. Automatic generation of notifications, routing and approval of documents by using MQ workflow reduces processing time to a great extent. One firm wide view to the client data and a single customer identifier provides a consolidated view of the client information to the users of the system.
- Accessibility: The new solution's presentation tier is a Web-interface that allows easy access to client data from any Web browser.
- Flexibility & Scalability: The three-tier architecture is intended to allow any of the tiers to be upgraded or replaced independently as requirements or technology change. This brings in flexibility to respond to changing business needs over a period of time.

Case Study 3 – Order Management System

Business Background

The client is a securities brokerage services firm focussing primarily on Dutch equities, equity derivatives as well as European real estate securities to institutional investors in Europe and the United States. The company aims at delivering top quality research and seamless execution services to its clients. Beside equity and derivatives the client specializes in fixed income trading and gives specific clients (small asset managers) the facility to place orders directly on Euronext Amsterdam using its exchange connectivity.

Business need

The whole process of client order capture, execution and completion was under a manual setup. This process lacked flexibility and was very time consuming. Also new regulations of the Dutch financial market regulatory association (the AFM) required market participants to have audit order trail and separation of proprietary and client orders.

In addition to lack of flexibility and new regulations, the substantial growth of the client's orders flow created the need to automate their order management process.

Project Scope

Cognizant was engaged as a consultant and application development services provider with the objective of delivering an automated Order Management System (OMS) which addressed the following issues:

- Fully automated order creation, storage, allocation, routing, execution and notification
- Multi-market capabilities
- Compliance with the new AFM rules
- Interfacing with 3rd party Network
- Interfacing with the client's back office

Cognizant Solution

The Cognizant Order Management solution had a client-server architecture with C++ and COMM technology used for the server side and with C++ based GUI as the front end. SQL server was used to efficiently store the orders and executions into a database. The chosen architecture was flexible, scaleable and offered straightforward maintenance. To interface with 3rd party network the existing MQSeries middleware was replaced by TIBCO/RV so stability and connectivity could be ensured.

About Cognizant

Cognizant Technology Solutions (NASDAQ: CTSH) is a leading U.S based technology services organization, bringing world-class solutions and competencies in the area of application management, e-business, decision support to Fortune 500 companies. Headquartered in Teaneck, New Jersey, Cognizant has nine offshore software development centres in India and two near-shore development centres in Phoenix, Arizona and Limerick, Ireland. Cognizant sales and business development offices are located in Atlanta, Chicago, San Francisco, Minneapolis, Los Angeles, Dallas, Toronto, London, and Frankfurt.

Cognizant is a leading provider of information services solutions to industry segments such as Banking, Insurance, Financial Services, Retail, Pharmaceutical, Healthcare and the Information Defined industry worldwide, amongst many others. Cognizant's core technology competencies encompass a range of areas from legacy and client/server systems, web-centric applications, data warehousing and component-based development. Cognizant's matrix structure leverages the experience and domain expertise in key industry verticals along with the strong technology expertise to delivery significant value to our customers.

Cognizant announced global revenues of $586.7 million for 2004. Over the past years, Cognizant has been listed in the top 25 IPOs of 1998 by Red Herring magazine; named Public Company of the Year by New Jersey Technology Council; appeared at # 18 in the Business Week 100 Hot Growth Companies and has been named the 1999 #1 Best Small Company in America by Forbes Magazine. Our CMM Level 5 assessment places us in a handful of companies worldwide with a capability to deliver very high quality. Cognizant has been also assessed at PCMM Level 5 and certified at BS7799 for security. Cognizant is also investing significantly in Six Sigma initiatives by imparting the relevant training to its associates.

Based on sustained revenue and earnings growth, Forbes magazine named Cognizant among the 200 best small companies in America two years in succession. **For 2002, Forbes ranked Cognizant as the Top technology company in the US among the Top 200 Best Small companies.** Cognizant employs more than 22000 computer science and engineering professionals globally at its client sites and development centres.

Leveraging on strong customer relationships, impeccable solution delivery and tremendous value in Cognizant's delivery quality, Cognizant has posted 21 consecutive quarters of sequential revenue growth.

Cognizant Banking Practice

Banking and Financial Services is one of the key Industry Domains serviced by Cognizant. Cognizant possesses over 3500 person years of cumulative experience in this domain, offering cross-platform software solutions to the different segments in this industry. In order to specifically address the needs of the Banking industry, Cognizant has a full-fledged Banking Business Practice consisting of over 500 highly qualified and trained technical and business associates. Cognizant's Banking Practice leverages on comprehensive understanding of the business and technology drivers, helping deliver quick and innovative solutions to an industry that thrives on speed, efficiency and bottom-line results.

In the course of providing solutions, Cognizant's focus is on constantly updating its domain knowledge and expertise as well. This, in turn, favourably impacts Cognizant's ability to provide quality solutions with less learning curve and quicker turnaround time frames. Cognizant monitors the trends in the Banking industry closely— initiatives and developments such as Basel II, Continuous Linked Settlement, Open Finance, Account Aggregation etc., and orients itself to emerging domains quickly. A dedicated team of business analysts with cross-domain industry experience is involved in monitoring the banking industry and retrofitting Cognizant's solution offerings to give clients a sustainable competitive advantage through cost-savings and increased operational-efficiency. Cognizant works on a diverse portfolio of projects in areas of banking covering retail, corporate, investment banking, capital markets, private banking, investment management, core banking, treasury & security services, credit cards, Imaging and archival solutions, etc.

For any clarification / feedback on the content of the document, please contact :
- *Deepak Tirumalai at Deepak.TirumalaiAnanth@Cognizant.com*
- *Ian Morris at Ian.morris@cognizant.com*

For Sales related queries, please contact :
- *Peter van Wely at Peter.Van.Wely@cognizant.com*
- *Paul Stokes at Paul.stokes@cognizant.com*

Cognizant

World Headquarters

Cognizant Technology Solutions
500 Glenpointe Centre West
Teaneck, NJ 07666
Phone: 201-801-0233
Fax: 201-801-0243
Toll Free: 1-888-937-3277

India Registered Office

226 Cathedral Road
Chennai 600 086, India
Phone: 91-44-28270063
Fax: 91-44-28262507

European Offices

20 Orange Street,
London - WC2H 7EF
United Kingdom
Phone: 44 (0) 207-321-4888
Fax: 44 (0) 207-321-4890

Herengracht 136
1015 BV Amsterdam
The Netherlands
Phone: 31 (0) 20-524-7700
Fax: 31 (0) 20-524-7799

www.cognizant.com

NOV 05