EXECUTIVE SUMMARY

This report focuses on straight through processing (STP) for the buy-side financial industry. The report draws up a framework for the STP business case and introduces definitions of different graduations of STP in this industry segment.

The rationale behind the traditional view of STP as a way of efficiently moving data from one part of the organisation to another is challenged. The report concludes that this interpretation of STP is achieved only by the sheer insufficiencies of legacy and dated sub-systems currently prevailing in the fund management industry.

The industry has realised that a coherent and consolidated system infrastructure is required to support modern fund management operations. Providers of existing systems have thus given the STP message an interpretation as some sort of panacea capable of converting a landscape comprising a variety of different systems and technologies into such a consolidated platform.

The report concludes that this is a backwards approach to STP, and that real STP can never be achieved by such a “top-down” approach. True STP should be about supporting business flows and not about shuffling data back and forth between different databases. The only way to achieve true STP is to take a “bottom up” approach, i.e. to ensure that the data consistency is intact throughout the entire fund management operation. When data is consolidated in a central database across the entire operation, then the business logic can be added on top of this data platform.

The report also suggests how STP based on a consolidated data model can be achieved in practice as a staged project. STP implemented in a structured fashion as a staged project based on the bottom-up approach will have significant business value for a fund management organisation. It is furthermore recommended to analyse the return on investment (ROI) inherent in any potential STP project under consideration. Important factors for such analyses are listed in Appendix A. [LH1]

The winners in the increasingly competitive fund management business will be those managers able to create a competitive edge in stable markets as well as in bull and bear markets. This means flexibility for change and growth, but also lowest possible cost of operation, measured as basis points on assets under management.
The target audience for the report is therefore senior executives with overall responsibility for profitability and operations in fund management businesses. A full appreciation of the benefits represented by the suggested STP approach requires a shift away from departmental thinking and a holistic view of the fund management operation.

INTRODUCTION

Straight through processing (STP) has been in financial industry vocabulary for some time, but the focus on STP in media and among industry practitioners has sharpened during the past 5-10 years.

There are several reasons for this, both from economical and operational perspectives. However, as always when a buzzword gains attention and popularity, there will be players in the market who will seek to “ride the trend” and exploit it for promotion of their products and services. The term STP is therefore often overstretched, even abused, and in the media and in advertising material may be associated with everything from simple data file transfers to sophisticated automated processes.

One thing is certain – straight through processing has different meaning for different people. This report will focus on STP for the buy-side fund managers. The report will highlight the main drivers and inhibitors for STP and suggest how STP can be achieved in the most practical and economical way for this part of the industry.

Ultimately the success of a commercial entity is measured in terms of growth and profit. The report will therefore pay due attention to the value proposition embedded in the STP message and point to factors that should be incorporated in return on investment (ROI) analyses of STP projects.

WHAT IS STP?

As mentioned, the term STP is given different interpretations depending on the circumstances. In this report, STP describes a fully automated flow from front office to back office, and from back office to front office, in a buy-side financial institution. The formal definition of STP for the purpose of this report is therefore:

“A fully automated flow from investment decision making to financial accounting and back without human intervention. All stakeholders in this flow have up-to-date quality data available as and when required to perform their roles in an optimal way.”

The definition covers two basic requirements:

- the flow is automated, i.e. human intervention is only required for decision making and exception handling, and
- all participants in the fund management operation – irrespective of their roles in the processing chain – can always trust that the data upon which they operate is up to date and of good quality.

This is an ambitious goal, and it covers more than just transaction processing; it addresses the entire business flow in a fund management operation, including how the various entities involved in the operation communicate internally and with the external world.

Note that the definition sets out the requirement that data should be there when needed – i.e. timing is an important element of STP.

Internal and external STP

At this point it is worthwhile making the distinction between internal STP and external STP.

Whereas internal STP covers the business flows associated with internal activities in the buy-side organisation, external STP is about linking these flows with automated communication lines to and from third parties. Such communication may be the interaction with brokers and custodians as a part of the dealing, confirmation and settlement process. However, external STP also covers automated import of static data, prices, rates and other data from external data providers, as well as automated export of output data from the fund manager (NAV figures, client reporting, regulatory reporting etc.).

The overall objective is of course total STP, and internal and external STP therefore go hand in hand – the value of either of them is severely impaired if the other is not in place.

Furthermore, the approach in this report is to discuss STP from a business workflow perspective rather than a technical perspective. The focus in media and at conferences on STP has revolved around messaging standards and how to transfer data electronically from one place to another. However, whereas data transfer is inevitable in the fund manager’s communication with the outer world (i.e. external STP), any transfer of data required to support the fund manager’s internal workflow (i.e. internal STP) is a consequence of the fund manager’s own internal system infrastructure.

The fund manager therefore is free to take appropriate and independent actions to reduce operational risks and costs by improving the internal STP platform. However, when it comes to external STP, the fund manager is dependent on others, in that the external messaging needs to be processed in a specific format according to an agreed standard.

STP levels

When discussing STP support from investment management systems, it is relevant to classify along two dimensions; data infrastructure¹ and support for automated processing by the applications involved². Automation of business processes will of course always be based on the data made available for the application, so the two dimensions are inter-linked.
The classifications are as follows:

**Data Level 0**
An infrastructure based on disparate systems and databases where data transfer is required in order to support the workflow. Such data transfer happens mainly via manual re-keying.

**Data Level 1**
An infrastructure based on disparate systems and databases where data transfer is required in order to support the workflow. Such data transfer happens mainly via electronic data transfer.

**Data Level 2**
An infrastructure based on disparate systems and databases but where all data is consolidated in a master database. Data transport is automated electronically and happens with regular intervals from all local databases into the master database. Consolidated data can always be extracted from this master database.

**Data Level 3**
An infrastructure based on one consolidated system operating on one consolidated master database. All functions have access to real-time updated data, as no data transport is required in order to achieve internal STP.

**Processing Level 0**
Business logic does not support automated processes, i.e. operations have to be carried out manually by the user (for example, allocations, matching settlement etc.)

**Processing Level 1**
Business logic supports automated processes to a certain degree. Operation of the system is partly based on exception handling and partly on manual operation.

**Processing Level 2**
Business logic supports automated processes, and operation of the system is mainly based on exception handling or because active decision making requires intervention.

**Processing Level 3**
Business logic is designed from inception as being based on automated processes, and operation of the system throughout is based on exception handling or because active decision making requires intervention. New flows can be introduced and existing flows can be remodelled by configuration of the system rather than by reprogramming of the code.

Processing Level 3 combined with Data Level 3 will give the ultimate STP configuration; a fully automated flow (core processing all hands-free) based on consolidated real-time data.

As stated in the STP definition, the STP requirement covers timing as well as automation. From a business point of view, it is therefore helpful to introduce metrics on overall processing capacity (and thus intrinsically – data availability). A metric often used is “delivery time buckets” – i.e. guaranteed minimum periods of time that the different parts of the organisation have to complete certain tasks.

**STP DRIVERS**

The emphasis on STP in the market originates from a mix of different sources. Consider the following stakeholders of a fund management operation:

**Clients** – Want transparency, timely quality reporting and highest possible return on investment with lowest possible administration cost and within acceptable levels of risk.

**Fund managers** – Want competitive edge and flexibility to grow and change with lowest possible cost and at lowest possible operational risk.

**Management** – Demands timely access and full visibility exposures, in many cases on regional and global levels.

**Custodians** – Want early instructions in order to keep deadlines.

**Brokers** – Want effective communication and efficient execution in order to service more clients.

**Regulators** – Impose rules for handling of financial portfolios, for reporting, and set deadlines for execution of various tasks.

**Shareholders** – Want return on equity investment in the holding company, i.e. highest possible profitable revenue overall (often indicated by a rich set of product offerings and high level of assets under management) with acceptable risk.

**Auditors** – Want audit trail and insight into history, procedures and control mechanisms.

For all stakeholders, accuracy of data is paramount.

Most of the requirements brought forward by the different stakeholders listed overlap and distil to the same basic keywords for the fund manager;

- Maximum return
- Minimum cost
- Acceptable risk
- Compliance with regulatory requirements
- Flexibility to grow and to change business strategy

These requirements are not new, but coping with them at a satisfactory level has become more difficult over the years due to increasing volumes and competition. In particular, the difficult market conditions experienced all over the world in the new millennium have brought about measures and innovation on several levels in the industry – by way of consolidation, new strategies and new financial instruments.

While STP initiatives were historically driven by the Securities Industry Association (SIA), it is important to stress that STP does not exist solely to please the regulators. Even though some organisations may need a push by way of statutory regulations in order to get moving, the winners of the game will be those who work on STP initiatives with the aim of improving their business and creating a competitive edge in the marketplace.

In times of soaring share prices and willing investors, focus is often drawn away from the cost side of the fund management operation. The fund managers mainly earn their revenue from the amounts of assets they have under management, and in bull
markets focus is on securing revenue by boosting funds under management.

However, in times of less bullish sentiment – and definitely in bear markets – the fund managers will have to protect their margins through focus on operational effectiveness and reduction of costs.

The market conditions experienced over the past couple of years have therefore put increased focus on STP – the fund managers need to ensure that the costs measured as basis points of assets under management are kept at an acceptable level.

**STP INHIBITORS**

As there seems to be a general consensus on the importance of improving STP for fund managers, one wonders why the industry has not made more progress on this front. After all, in comparing the fund management business with other industry sectors, it seems relatively easy to find examples of business sectors that have managed the transition to automated processing better (e.g. travel, telecommunication and even purchase of groceries). Even if we recognise immediately that it is not fair to compare like for like this way due to the complexity and security aspects of fund management operations, it is clear that this particular industry struggles with some major obstacles that prevent more rapid progress.

Again, it will make sense to distinguish between internal and external STP.

**Internal STP**

The business of developing, selling and implementing investment management systems is highly competitive. The development of new systems is a costly process, and the vendors will try to capitalise on the investment made on such development for as long as possible. For some, embarking on a new major development project is simply not an option because of the huge costs involved. Vendors will therefore tend to keep their cards close to their chests, and will of course promote their own solutions as the way forward despite glitches, shortfalls and dated technology.

This persistence among vendors and developers of in-house built systems to extend the lifetime of their solutions beyond what would be reasonable from a technological and architectural point of view is a serious inhibitor to STP. Many of these systems were never designed to cope with the volumes, instrument varieties, and functional or technical requirements of today’s fund management environment, but they survive for some time in the market mainly due to a general reluctance to replace something that is already installed and running.

Perceived cost of systems replacement is of course also always a significant barrier for improvements of internal STP. Any investment, including that in new systems, should only be made if the ROI is acceptable in comparison to other potential uses of the resources involved. One of the most important factors on the cost side is the cost of actually implementing the products.

Implementation projects normally fail for one or more of the following reasons:

- Lack of standard concepts and tools for migration of data in the new system.
- Lack of flexibility of the new system.
- Lack of transparency and access to data in the old system.
- Lack of willingness to change existing operational procedures in the organisation.
- Lack of business understanding from implementation consultants.
- Lack of commitment from management.

No chain is stronger that its weakest link. A successful, on-budget, implementation project hinges on the ability to cover all the above issues just as carefully as the assessment of the functional fit of the product itself.

Fund managers who take all these aspects into consideration have every good reason to expect a successful implementation project, including a predictable implementation cost. In this respect it is important to assess a potential vendor’s implementation track record. A product that is repeatedly implemented with success across different businesses has proven that it possesses the required flexibility and that it comes with a viable implementation process.

Other major inhibitors of STP are lack of data consistency and quality. A survey conducted by CAPCO, Reuters and Tower Group1 in 2001 revealed that inconsistent, inaccurate and incomplete reference data was identified by the industry as a major cause of STP failure. In the survey, 79 per cent of the respondents strongly agreed that this was the most important STP inhibitor. Furthermore, the survey points out that 30 per cent of all failed trades were directly due to bad quality reference data. Not surprising then, that the SIA at that time came to the same conclusion and as a consequence found it necessary to focus on measures to rectify this situation rather than pushing for reduced settlement periods (see section 4 – STP Drivers).

On a related note, complications associated with connecting different systems are identified as major threats to overall internal STP. The source of the problem here is the so-called “best-of-breed” architecture. The idea with this approach is to obtain the best functional fit for all areas of the fund management operation by implementing specialist systems for each and then enabling them to communicate, in order to achieve STP.

The essence of the problem is that the data underpinning the entire fund management operation is by nature unsuited to be represented in several subsets across different databases. After all, the vast majority of all data (static, transactions, holdings, prices, rates.) are needed throughout the entire fund management operation – front to back. Any replication of data across different databases is therefore a source of operational risk and a potential threat to STP.

Most best-of-breed systems were conceived independently of each other and were not designed to communicate with each other. Furthermore, their individual databases are not generic but tailored to contain data in a specific format to best service the exact functions they perform. At best, interfacing between systems therefore introduces a need for constant data transfer and reconciliation. At worst, data cannot be transferred in a sensible way at all, and STP becomes an illusion.
In summary, the main inhibitors to internal STP are:
- lack of openness in the vendor community due to competition and protection of own business;
- reluctance among vendors to invest in development of new products and technology;
- system infrastructures based on several disparate systems cause connectivity and reconciliation problems, and inevitably lead to data inconsistency;
- reluctance among fund managers to replace legacy systems due to the risk involved with the implementation of new systems (this reluctance is partly caused by system vendors’ failure to deliver documented and tested migration concepts); and
- uncertainty regarding ROI.

External STP

Inhibitors to external STP are mainly associated with the plethora of different messaging formats and techniques in the marketplace. As it is today, significant resources are consumed developing basically the same kind of interfaces again and again, but in different formats depending on message type and the recipient of the messages. On top of this, fund managers often have to invest in a multitude of network subscriptions, technology and development of internal skills in order to cover the desired messaging from front to back with their counterparties.

In this rather confusing environment, it is not surprising that fund managers are discouraged from taking on automated electronic messaging to its full extent. Ultimately, it is necessary to compare expected benefits from such messaging with the cost and hassle associated with implementing and maintaining it. And in these times of rapid changes with respect to formats, methods and suppliers, the costs of implementation and maintenance, combined with the fear of “betting on the wrong horse”, will put many off.

So is the panacea for external STP, then, either a solution based on middleware or perhaps outsourcing the whole problem? Certainly, when it comes to messaging and external STP, it makes sense to have a structured layer in between the investment management system and the outside world. This way, new formats and message types can be maintained and set up in this layer without the need to change the core of the investment management system itself. A sensible and flexible middleware product could very well constitute such a layer. However, care should be taken to select the right product. As the middleware must work intimately with the investment management system, it is important to find a product that fits well with the infrastructure of this system. It is furthermore crucial that the vendors of the different products can prove they are able to work together and deal jointly with potential problems arising during implementation and maintenance phases.

Outsourcing of message handling (to so-called concentrators) could be an alternative for some (typically smaller) fund managers. However, the concentrator will need some kind of formatted set of messages as well, and outsourcing is therefore in a way no more than a variation on the theme of a middleware solution. The compelling argument for outsourcing is that the fund manager will only need to develop one messaging format and invest in one point of connectivity (to the concentrator). On the other hand, outsourcing means giving up control – and any plans for changes the fund manager may have in the future are totally subject to the outsourcer’s capability to service such changes.

With all the talk about messaging standards, middleware and outsourcing, one must not forget that external STP to a high degree hinges on the flexibility and openness of the internal investment management system itself. A serious inhibitor, also for external STP, is the continued use of dated investment management systems based on closed databases (or even in-house built file-storing mechanisms). With such systems, data exchange and automated processing become impossible – even with the most brilliant piece of middleware.

A further factor simplifying the decision process is the development in the trade matching area. Solutions from vendors such as Omgeo have increasing industry backing, but not widespread use. Fund managers continue to wait for others to connect before acting themselves. In the meantime, they have proceeded as before with current manual and semi-automated processes – reluctant to invest in improvements while awaiting a better solution that was perceived to be just around the corner.

The main inhibitors for external STP can therefore be summed up as follows:
- too many message formats: expensive to cope with them all, risky to bet on just one
- critical mass in the use of central matching
- finding the right middleware is not straightforward
- concentrators – do they deliver and is it cheaper?
- inflexible investment management systems where data is inaccessible, and
- uncertainty regarding ROI.

OVERCOMING STP INHIBITORS – A STRUCTURED APPROACH

THE CONSOLIDATED DATABASE

Fund management operations comprise of a number of main functional areas:

Front office
- decision support
- order management

Back office
- confirmation, matching and settlement
- corporate actions
- custody reconciliation
- fund administration
- investment accounting
- financial accounting

3 Reuters, Tower Group Capco – "Reference Data, The key to quality STP and T+1"
Middle office
- risk and compliance
- performance
- audit trail and operational risk control

The flow between these areas varies from fund manager to fund manager – but this is not important in the context of this report. The key observation is how all core activities in a fund management organisation are inter-linked and that the effects of one activity in one area immediately impact on the decisions and activities in other areas.

All areas of activity are based on the same set of data. Investment decisions spark orders, which spark executions, which spark performance figures, new positions and various back office activities which in turn change the input for new investment decisions. On top of this, there is constant risk and compliance monitoring, audit trail of the entire process, updating of market data etc.

Another important observation is that the activities are often event-driven and triggered by arrival of new information and data (e.g. market prices and corporate actions). A structure based on rigid procedures and sequential steps is often less than ideal as support for such activities. STP is not a “one-way street”. Traffic goes in all directions.

The key point when discussing STP is that all activities supported by investment management systems in a fund management operation are interrelated and based on the same set of data, and that the success of these activities is dependent on the quality and timeliness of this data. Relying on an infrastructure where data is scattered across different databases, and where constant reshuffling of data from one place to another is required in order for the systems to work, is therefore conceptually wrong – and seriously flaws the preconditions for STP.

Consolidated systems based on a single data architecture take the opposite approach. They recognise the importance of data quality and the misery of data redundancy. These systems therefore take a bottom-up approach, starting with the design of the complete data model for a financial institution. This data model is implemented on a single data architecture, to ensure effectiveness and avoid redundancy. The business logic will then be implemented as a set of software modules interacting directly with this master database.

Figure 2 visualises how the architecture behind a consolidated system is very different from that inherent in a concept based on a number of disparate best-of-breed systems. The figure may seem provocative, but is not out of line with truth. The survey by Reuters, Tower Group and Capco reveals that 48% of respondents’ instrument and master file reference data were spread across 10 or more systems, whereas 8 per cent said they had data in 150 systems or more. On average, 58 full-time employees were required to maintain and reconcile these reference data at a cost of $3.2 million per annum.

As previously stated, 79 per cent of the respondents agreed that bad quality reference data was the main inhibitor to STP. As one famous quote from the market states, “All you get from automating a system based on chaos is faster chaos”. The driver behind the consolidated system’s architecture is to ensure data quality to avoid chaos, and thereby, in a conceptually logical way, create a platform upon which STP can be successfully implemented. A truly consolidated system offers STP Data Level 3 – where delivery time buckets (see section 3.2) are non-issue because the same physical data is accessed in real time by all parts of the organisation.

The migration platform

The previous section explained the principles of consolidated systems and how such systems are conceived to address the very core of STP prerequisites – data consistency and timeliness. The main criticism of consolidated systems has always revolved around scepticism as to whether one system can provide sufficient functionality within all areas of fund management – from front to back. However, as much as this argument is both logical and reasonable, it does not address the basic value proposition of the concept brought to market by such systems.

Consolidated systems need to have very broad functionality – there is no doubt about that. However, they do not necessarily need to be best of breed within all areas for the proposition to be attractive for a fund management business. As the design of a consolidated system starts with the establishment of a consolidated database, new business logic can be added on top as a natural part of an on-going evolution of the system. Such evolution can happen quite rapidly,
as product development based on one standard and where connectivity is a non-issue, is very efficient. Furthermore, the consolidated system intrinsically offers a benefit unachievable by any other architectures: the flexible migration platform.

Implementation of a consolidated system starts with consolidating the data from existing sources within the organisation. As the system is based on one standard database, this process is not as cumbersome as it may sound, and it is in fact likely that the system offers standard mapping and validation tools for this.

Once the data is in place, it will serve as a master database platform for the entire fund management operation. It is important to note that there is nothing to prevent third-party systems operating in this environment as well – as long as any data from such systems are immediately piped into the common data pool. This way, a consolidated system can cover some of the (major) components of the total functionality as well as assuring overall data quality, whereas other functional areas can be covered by best-of-breed systems.

Figure 4 shows an architecture where STP Data Level 2 is achieved with an infrastructure based on a consolidated system delivering the common data pool and also providing the functional support in some core business areas, but where other business areas are supporting by other software communicating with the data pool.

The fund manager now has full flexibility to grow within the platform by switching on new modules in the consolidated system to support changing or new business functions. Furthermore, the fund manager has the option to replace ancillary third-party products with modules from the consolidated system, say, when these modules are considered to compete adequately with best-of-breed products within their respective areas.

The migration platform offers the fund manager a concept where it can gradually move towards a more and more consolidated platform, reducing the numbers of separate systems and complex interfaces and thus improving the STP platform towards Data Level 3, while all the time ensuring data consistency and quality. Furthermore, an important aspect of the concept is that this can be achieved at the fund manager’s own pace – without the need for a big bang implementation.

CONCLUSION

This report has focused on the STP case for fund managers. The struggle to achieve acceptable levels of automation in this part of the financial industry is caused mainly by failure to focus on the core requirement underpinning all fund management operations – consolidated, high-quality data throughout the entire operation.

The report presents an architecture designed to resolve this fundamental issue – the consolidated fund management system based on one single data architecture. Furthermore, an approach to gradually implement such a consolidated infrastructure as a staged, non-disruptive process is presented by way of a migration model.

All investments need to be justified by thorough internal analysis. Important elements of such analyses are ROI assessments by way of internal rate of return and net present value of the STP project. In Appendix A, we suggest elements that should be part of such ROI calculations.
STP projects need to be initiated and supported by executive management. With the right approach, such projects are likely to bring huge benefits to a fund management business both by way of cost saving and as a vehicle to gain competitive edge for the business.

APPENDIX A
FACTORS FOR ROI ASSESSMENTS OF STP PROJECTS

When considering any strategic business initiative, it is necessary to estimate return on investment (ROI) in that initiative. Taking action to improve the efficiency and effectiveness, and hence the profitability, of an investment management business, by improving STP, would be no exception.

The ROI will depend upon the precise nature of the business, as well as its current operational condition. However, it is possible to suggest a generalised checklist of the types of costs that may reasonably be expected to be saved by moving from a best-of-breed architecture to an integrated platform. We present such a list here.

Not all costs below would apply in every case, and their relative size would vary too. Some are much easier to estimate than others. Nevertheless, we understand that investment managers find it useful to consider the following sources of profit drain inherent in businesses where a best-of-breed approach to system selection has previously prevailed.

The list is in three categories, showing costs associated with:

Unnecessarily complex business systems architecture

Operational inefficiency and operational risks resulting from this

Difficulty in adapting to new business opportunities and requirements

Unnecessarily complex business systems architecture (all are direct costs):

- Licence for each application software component (most unnecessary).
- Licence for each application software component’s database (most unnecessary).
- Licence for middleware (redundant for internal STP purposes).
- External maintenance and external consultancy cost for each application software component, each database and for middleware.
- Internal support cost for each application software component, each database and for middleware, including support for each technology used (for example, Unix & Windows NT, Sybase, Oracle & DB2).
- Cost of data for each system (price data, market data, static data).
- Cost to administer security in each system and across systems.
- Costs to administer production scheduling for each system.
- Costs of hardware on which to run, e.g. discrete servers, multiple workstations per employee, multiple instances of data.
- Costs of integration of multiple systems with external services, e.g. front office analysis environment and performance attribution system both require index data.
- Costs of integration between software components (data transport, duplication and reconciliation, data cleansing) – much of this possibly proprietary development.
- Costs of new releases/upgrades for each software component.
- Costs of implementing new releases/upgrades of each software component.
- Costs of maintaining interfaces between systems.
- Documentation cost for each piece of software and for each interface.
- Costs of training staff on each piece of software they use
- Management, legal and administrative costs to interact with multiple vendors.

Operational inefficiency and operational risks (mostly indirect costs):

- Costs arising from delays in information delivery to end users, or discrepancies (even if only temporary) between data – such as holdings/transactions – held in different systems and delays in deriving information from dispersed data, including cost of initial problem and correction, such delays and discrepancies resulting in:
  - Impaired investment decision making
  - Breach of client guidelines
  - Misedealing (accidental and deliberate)
  - Failure to benefit from corporate action
  - Fund mispricing
  - Settlement problems, including matching or settlement failure
  - Failure to reconcile with custodians
  - Fraud
  - Incorrect reporting to clients and regulators
  - Poor client service
  - Inaccurate accounting
- Costs arising from human error in re-keying data and reconciling data in disparate systems and in interpreting data presented differently in different systems
- Waste of resources associated with delays cause by the following:
  - End users check/await reconciliation/reconciled data
  - Data cleansing and preparation of data for use
  - Scheduling, maintaining information flows, checking and aligning data/databases, rerun jobs etc. (all IT resources)
  - Management of data architecture and reporting
  - Management, restriction, authorization of
  - Users to access various databases, and
  - Transaction processing, and auditing of such access.
Costs arising from sensitivity to volume changes, such as:

- Need to hire temporary staff at peak times (for example, reporting season or corporate actions season).
- Portfolio rebalancing.
- Cost of losing clients due to any of the above.
- Cost of capital charges to cover operational risk, required by regulation.

**Difficulty in adapting to new business opportunities and requirements:**

Such difficulties may result in reduced margins, even to the point that potential new business becomes non-viable. Many types of new business opportunity (or requirement) may be included here, for example:

- New investment opportunities (in new instruments, on new markets etc.)
- New mandate restrictions
- New clients with high volumes, demands in reporting etc.
- New ways of doing business (for example, electronic trading, matching etc.)
- Merger or acquisition
- Strategic change in business mix (for example, increase retail business).
- Changes in regulatory requirements [LH2].