"The Drive to High IQ in British Telecommunications plc (BT): Deploying Information Quality Tools in a Federated Business"

(Practice–Oriented Paper)

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Abstract

This paper outlines a successful approach to introducing best of breed information quality management tools across a large, federated enterprise. It demonstrates how a small, business led project team with minimal funding and resource can make a significant contribution to corporate goals by putting information quality & integrity firmly onto the enterprise change agenda. The paper outlines the background of the project, its aims, progress to date, future planned work and suggests learning points that may be of value to other practitioners embarking on a similar Information Quality improvement journey.

Context

British Telecommunications plc (BT), once the United Kingdom's monopoly state telecommunications provider, now operates in the most competitive market place in the world. The UK today has over 200 licensed operators, with many more about to join the competitive fray. In order to survive and be successful, BT has recognised the need to transform itself from a traditional UK focused telco into a global, new wave Internet Protocol (IP) telecommunications and information centric enterprise. This drive towards the realisation of this vision, a fully electronic business – eBT - is well underway.

As part of this transformation a small information & knowledge management initiative, run from within BT's Group Strategy function, has been running since 1998. The overall scope of its activities was outlined in a previous paper to the MIT IQ1999 conference. [1] The primary objective of the programme is to develop common approaches and frameworks to information & knowledge management across the enterprise, thereby ensuring that BT's information & knowledge assets are optimised for the benefit of the enterprise as a whole. The need for common approaches has been re-emphasised in 2000 as BT undertakes a radical restructure of the company. By the end of the year a once monolithic business will become a federation of seven autonomous businesses, each with its own market & product offerings, ways of operating and support infrastructures. Despite decentralisation BT continues to recognise the need for the

BT Group overall to operate as a family of inter-working businesses, creating and sharing information & knowledge for the benefit of the whole.

The eBT Information Quality Imperative

The IP revolution is transforming the asset structure of business. Physical assets are increasingly becoming less important in determining the success and valuation of companies. Instead intellectual capital, including the value of information and knowledge assets, is becoming the critical determinant of perceived worth and future profitability. Hence the future stars of eBusiness will be those who manage and exploit information & knowledge most effectively. World class eBusinesses will also be world class iBusinesses. As Martin Butler of the Butler Group contends:

"Information... underpins the very essence of eBusiness. All organisations operating as an eBusiness must come to see themselves as information organisations. Information, and the routines put in place for its delivery, bind businesses and processes." [2]

In this new world, end to end automated business processes will extend across and outside the enterprise to customers, suppliers and collaborators. But extended, automated electronic processes will only become a reality if accurate and timely information is generated and sustained to underpin them. Information is no longer merely a support to business processes, it becomes their primary output and the common currency of communication with customers and collaborators. Failures will potentially be very visible and costly. Inaccurate information will damage corporate reputation, alienate customers & collaborators, increase costs of failure, reduce productivity, diminish morale and employee retention, and increase the chances of litigation and, in the UK in particular, regulatory intervention. Developing a high IQ culture is thus a key corporate priority for any eBusiness enterprise. Moreover, new paradigms are required to manage information. Self-management of customer information and supplier management of outsourced elements of the information supply chain will become the dominant model. But as Rich Olshefski of ISI observed in relation to customer self management of information:

"Today, more people are entering more data into databases than ever – and making more mistakes than ever. Such problems are only compounded in eCommerce environments where customers are more concerned with speed than accuracy. A recent study has shown that customer data input via the web is far less accurate than data keyed in by customer service representatives." [3]

So it is our contention that information quality is currently the major challenge for the great majority of large, established corporations who are moving into eBusiness. Ken Orr of the Cutter Consortium supports this view:

"It is likely that data quality is the most important problem large organisations face today. Information is truly the glue that holds the online organisation together... Zero latency organisations have to make the right split-second decisions based on their available, online data, and that is only possible if the data is correct." [4]

As a large, established corporation BT is no exception. It has a legacy of over 700 major operational support systems, with numerous smaller satellite systems and applications radiating around them. Its key information is fragmented and duplicated across these systems, with inevitable integrity & consistency problems. As a key component of its transformation it is therefore undertaking a major rationalisation and replacement of its current systems base to provide the support infrastructure for eBT. Migration of information & function from the existing systems portfolio to the new systems is therefore a mission critical challenge.

Origins of the IQ Tools Project

In anticipation of this challenge, particularly the need for rapid and cost-efficient information migration, the Group Strategy led Information Quality tools project was initiated in early 1999 as part of the overall information & knowledge strategy programme. Prior to this, in the latter half of 1998, an audit of information quality baselines and improvement projects within BT had been carried out. This was supplemented by an external study of best practice employed by other major corporations, including IBM, Hewlett Packard, American Express and NASD. The main findings of these studies were:

- In many areas, BT's information quality was not regarded as fit for purpose, either to serve today's operational needs or eBT. Many examples were cited, but customer related information and network inventory information were regarded as the key areas requiring attention, as it was here that costs of failure were highest, and where process automation opportunities for eBT were most dependent on zero latency, 100% accurate information.
- Despite these problems, BT had a great deal of information cleanse experience. One internal survey revealed that no less than 86% of a sample of 200 managers from across the company had been involved in at least one cleanse project over the last ten years. [5]
- In many cases the gains made from information cleanse activities had not been sustained. The main reasons for this were:

  - An overemphasis on the cleanse activity itself, and insufficient focus on correcting the root causes of dirty data. In part this was because it is easier to treat the symptoms than the root causes, but was compounded by the fact that changing end to end BT processes was difficult and time consuming.
  - Many cleanse activities were a reaction to specific business problems that had become visible. Often, therefore, the activities had to be completed quickly. Once the particular problem had been solved, the *status quo* re-emerged. Information quality management was seen as a one off, snapshot activity, not as a continuous process of improvement.
  - The majority of cleanse activities were focused on back end systems, and not at the point of information creation. This was predominantly a consequence of the fact that the impacts of poor quality information were more acutely felt at the back end of information supply chains than at the front end.
  - Many of the cleanse initiatives were expensive to sustain because cleansing was either carried out by one off, bespoke program developments, by manual means, or usually by a combination of both. As other subsequent business priorities

came to the fore, ongoing budgets were squeezed and so prevented holding the gains in the medium to long term.

➤ Solutions were customised to specific business / systems areas and so were generally not portable to other areas and systems. This further increased overall cleanse costs. Moreover there was no coherent set of communication channels for organisational learning and experience sharing.

➤ Although some bought in tools had been used, particularly in the area of name & address cleanse and management, notably PAF (Postcode Address File) based solutions, there was no consistent approach or tool set. Many different tools had been applied, and were still in use in some areas, but prior to deployment the problem owner had conducted his / her own evaluation and tender exercise. Again the lack of communication compounded the problem of repeating work already carried out elsewhere.

➤ The parallel external benchmarking survey had revealed one significant commonality when looking at industry best information quality management companies. This was that all automated cleanse activities as much as possible, and had sustained them by integrating best of breed tools within business processes and the systems environments that supported them. There was great scope for BT to do the same, but this opportunity had not been grasped to that point.

Objectives & Approach

In response to the above, the tools project was initiated in January 1999, with an initial budget of around $50k. This provided sufficient funding to acquire one full time senior technical analyst from BT's internal software house. Its formal aim was to identify, evaluate, test and implement proven, industry best information quality management tools to drive up information quality across BT. In particular it would seek to address the issues highlighted above by:

• Adopting a "buy not make" philosophy. There are a large number of tools' vendors, some with a great deal of experience of IQ management. We would focus on proven tools from established vendors, with demonstrable success across a large customer base. This was also consistent with the "buy not make" philosophy adopted for the new operational support systems transformation programme as a whole.

• Seeking to create a smaller portfolio of approved tools for use across BT, enabling standardisation and common solutions. This would also provide opportunities for reducing costs of tools already in use across the company through rationalisation and securing enterprise wide strategic deals with selected vendors.

• Acquiring tools that could operate both in batch and online mode, so that they could be deployed at various stages of the business process lifecycle from the point of information creation to use & modification in back end activities. A key objective was to deploy tools at the front end which made the creation of incorrect information as difficult as possible.

The initial step was to survey all potential marketplace offerings, and this was carried out via Internet searches and analysing vendor literature. This highlighted around 30 initial potential vendors & tools in total that appeared to meet one or more of the following requirements,

generated from the information audit and the best practice surveys. The main high level capabilities sought were the ability to:

- Identify and provide measures of information quality issues within a particular system or group of systems. Important was that the tools were sufficiently generic to identify problems across a range of information domains, but could also identify the highest quality information sources where information was duplicated across systems, vital in end to end management of migration activities.
- Automate cleanse activities where appropriate, so that the need for excessive manual effort or bespoke program development was minimised.
- Enhance existing information by providing value add third party data, for example name & address / PAF verification & expansion, Global Positioning capabilities, grid references and so on.
- Reconcile information flowing across and between systems. In both the current and future environment, BT's end to end processes require the seamless interchange of information between systems. Key was the ability to maintain information integrity across a variety of information sources.
- It was recognised that a key migration issue for BT is that in many of its legacy systems the business rules which provide information context have been insufficiently documented. Many rules are now buried within application code. Vital was that a tool could extract business rules from raw information in order that metadata could be distilled and built into the new systems environment. As the Standish Group recently observed:

  "No fewer than 88% of data migration projects overrun or fail completely... the weak link in data migration is in the efforts to unite data without adequate metadata." [6]

- The ability to operate in a variety of software environments, from PCs to mainframes, in both batch and online mode where appropriate. Critical was the ability to operate both on information *in situ* and during migration to new environments as tools deployed initially in legacy environments had to be portable to new systems with the minimum of conversion cost and effort. Also, once the information had been migrated, these tools had to provide both a batch and online audit and ongoing correction capability.

The initial evaluation was completed by March 1999, and a capability matrix of prospective tools against these requirements drawn up. No single tool was found to meet all our needs, and so a short list of candidates was drawn up, falling into three broad categories:

Information Enrichment. Tools that could audit, cleanse, and enhance information within specific systems.

Information Integrity. Tools that operate across systems platforms to provide end to end integrity & validation.

Information Profiling & Re-engineering. Tools used as precursors to information migration, to extract rules & relationships from legacy information and produce target information architectures to assist migration and design of new systems.

Once the shortlist had been created, a series of trials was then conducted, using areas of the business where the prior audit had identified particular strategic needs. At the start of the trials in May 1999 additional funding of $150k was secured to acquire skilled temporary area-specific IS resource and seed corn vendor trials. The areas chosen were UK Markets (Information Enrichment), Finance & Markets (Information Integrity) and Management Information Systems (MIS) & Network Management (Information Profiling). At the end of the trials a report was produced with the aid of business area owners and recommendations made.

As a result, three tools have been put onto BT's corporate Information Portfolio. They are:

Information Enrichment: Harte Hanks' Trillium software suite (http://www.trilliumsoft.com). Trillium provides name & address standardisation & cleansing functions including country specific validation against post office validated address files (in the UK this is the Royal Mail's Postal Address File (PAF)), record matching & deduplication, and functionality to evaluate and clean non- name and address information.

Information Integrity: Unitech's Autonomous Controls & Reconciliation (ACR) suite (http://www.unitechsys.com). ACR provides a business user driven tool set to audit and reconcile information automatically and autonomously across different parts of an end to end business process, including processes that are supported by a variety of hardware & software platforms.

Information Profiling / Re-engineering: Evoke Software's Migration Architect (MA) tool set. (http://www.evokesoft.com). MA is an information profiling tool which, through a three dimensional analysis of legacy system data, unlocks the metadata & business rules governing that data. It also uncovers discrepancies between any documented metadata and the true metadata inferred by analysis of legacy information, thus highlighting potential information quality problems. MA produces a validated third normal form schema, provides tools to test the impact of any necessary de-normalisation and therefore highlights information quality improvements that would need to be made to the source information before it could be successfully migrated to any new target system.

Achievements to Date & Current Work

The trials ended in July 1999. Since then implementation of these portfolio tools has been very rapid across the BT federation. In fact, in all trial areas the business owners recognised the potential benefits of the tools to such an extent that, with the help of the central team, they rapidly acquired operational tool copies for their environments. Hence implementation started much earlier than anticipated in the project plan, with the first tools live as early as August 1999.
Trillium is operational in UK Markets where it is being used to validate name & address records and to match customer records in support of marketing campaigns. It is now also a cornerstone product in a new integrated marketing repository, which went live in April 2000. Trillium is also about to be introduced into Customer Service systems to validate order handling and customer detail processing at the name and address entry stage. Later planned uses will extend to other information domains within Customer Service.

Unitech's ACR is also deployed within UK Markets where it is used to reconcile a variety of billing and other feeds with marketing revenue calculations. In this area alone savings of over $1 million have already accrued in cost reductions and increased information accuracy. ACR is also live within the billing and revenue areas of BT's mobile division (BT Cellnet), and within both Group & UK Finance operations. It is also being trialled within Networks Management where it is being used to identify discrepancies between network & billing systems' records of circuits. This work is anticipated to generate significant additional revenue and cost reductions.

Migration Architect is operational in the MIS domain, where it is primarily used to analyse and rationalise the multitude of information feeds from operational systems. It has also been used within Network Management to assist in understanding legacy system network records in preparation for a migration of those records to a new environment.

During 2000/01 further work is underway to trial and eventually deploy the tools elsewhere across BT's primary transformation areas. In parallel with this the central team is creating BT wide user groups to ensure that learning is shared and successes communicated. Through our contacts with vendors we are also in touch with tool users in other companies to share experiences, and to channel external best practice back into BT. Raising awareness across BT as a whole is also vital for further adoption and so an Intranet site has been developed to promote the benefits of the work and supporting tools. We are also focusing on rationalising the current plethora of Name & Address / PAF tools in use and promoting Trillium as the alternative, standard approach. A key current activity is the development of a methodology and associated set of guidelines to assist others in BT to choose the right tool combination to address their particular information quality requirements. Finally, it is important that we continue to monitor the market to maintain our awareness of new products, and communicate findings via the user groups and Intranet site.

Benefits of Approach

A number of benefits have accrued from the approach adopted:

- The IQ tools project has now become widely recognised across BT as the centre of excellence & expertise for Information Quality issues. This ensures that learning and best practice can be communicated and potential business area adopters put in touch with early adopters elsewhere across the BT federation. Through the rapid implementation of these tools and their perceived benefits, information quality is now seen as a critical transformation enabler.
- In a federated business such as BT, where business areas have a high degree of flexibility in choice of tools and methods, the promotion of a common tool set has to be by persuasion, not enforcement. Here a small central function acts as the hub of a wider network of practitioners across the business and IS communities in BT, which together act as influential consensus builders. Moreover, the fact that initial evaluations have been carried out greatly accelerates implementation of the tools in further areas, with earlier delivery of benefits.
- Having a small central team benefits both BT and current & prospective tools' vendors. By involving the team in all vendor negotiations BT can benefit from economies of scale in

negotiating licences. The vendors also benefit because the central team is able to identify further internal application area opportunities and work with vendors to exploit these. It also acts as a central point within BT to communicate user suggested enhancements and improvements to the vendors as input to their tool development plans.

- The team is able to provide a "try before you buy" service. It has access to all Portfolio tools and is able to analyse sample data to highlight and quantify potential information quality issues and test the tools' ability to alleviate or resolve key problems. Apart from selling the potential benefits to prospective users, this also facilitates the production of business cases for operational deployment.
- Finally, the development of a common tools portfolio reduces costs of ownership across the enterprise and facilitates the portability of solutions.

Lessons Learnt & Conclusions

It is hoped that this paper will be of value to those in large enterprises who are trying to raise the profile and importance of information quality issues. The deployment of industry best tools do not in themselves resolve the many complex issues that compromise information quality. The creation of a true high IQ enterprise requires a holistic approach, encompassing culture change and business re-engineering as well as the deployment of best of breed tools. However, an early focus on tools is of great benefit as they are a very effective way of achieving relatively rapid wins. In doing so they raise the profile of IQ and so pave the way for the wider changes required.

It is suggested that the approach described in this paper is one way of making this happen. To summarise our key learning points:

- Create a small but dedicated team, with a modest budget. Use the budget to conduct initial evaluations, provide seed corn funding for trials and fund ongoing central IS consultancy and support.
- Ensure that the team contains both business people who can identify the opportunities for IQ improvement, and sell the benefits into the business, and an expert technical analyst who becomes an authoritative source of technical advice and tool capability.
- Buy not make. The established vendors in the market have many years of experience gained by working with many different companies to help them solve their IQ challenges. Do not try to reinvent wheels; your in-house products are unlikely to be as efficient, cost effective or quick to deploy.
- No single tool will meet the totality of your enterprise's IQ needs, despite some vendor claims. A portfolio must therefore be created, but discourage unmanaged proliferation of tools to facilitate standardisation & reduce costs of ownership.
- When promoting the tools, focus on information areas known to be critical in underpinning the achievement of key corporate strategic goals. This will enable you to secure senior management interest and leadership, vital preconditions of success.
- Do not underestimate the importance of communication and awareness raising. Use all methods at your disposal, including your corporate Intranet, internal publications, and internal conferences and demonstrations to promote the tools. Target communications at

both senior managers and front line personnel who are directly impacted by IQ problems. Use the latter to open doors to enable you to influence the former.

- Remember that the development of a high IQ enterprise requires a long term commitment. Be prepared to take time to plant the seeds, and to support the subsequent growth. As Voltaire observed, *"That is well said, but we must all cultivate our own gardens."* [7].

Acknowledgements

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