

Financial Analysis of Enterprise Application Integration

Constellar and ScottishPower:
Achieving Business Benefit

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Executive Summary

"The average IS budget as a percentage of revenue has doubled in the past four years. The 1995/96 Gartner IT Budget and Best Practice Survey showed the average IS budget was 2.11% of revenue. The 1998 worldwide figure for IS budget is now 4.17% of revenue. Large companies account for the bulk of this change since 1994."

1998 Gartner Group IT Spending and Staffing Survey

Why Is Enterprise Application Integration a Hot Issue for CEOs and CFOs?

According to the Gartner Group, 35-40% of all programming effort in a typical computing environment is devoted to developing and maintaining the extract and update programs whose only purpose is to transfer information between different databases. Gartner Group refers to the complex, unstructured integration of disparate applications as "inter-application spaghetti".

Imagine that you have embarked on a major organisational review with the objectives of re-engineering transactional processes, improving management information and saving costs. One of your consultants discusses the systems implications with a member of the IS department. The consultant is told that the complex system integration requirements are "not a problem" as the company has a rapid systems integration and data transfer service based on a software product called Constellar Hub.

What would be the benefit to your company if it were in this position?

If you have responsibility for IS in a large company which was implementing a critical infrastructure project and you were told that an unknown product from an obscure supplier could provide a fundamental enabling technology, would you listen?

The Gamble

In the case of ScottishPower, David Jones, Managing Director of the Information Systems Division, did listen. ScottishPower is a multi-utility company, which has emerged as a strong player in the UK and overseas market. Its systems environment is complex and needs to be highly flexible to respond to the continual pressure and opportunities caused by the liberalisation of its core markets and strong competition in its emerging businesses. ScottishPower recognises that business agility, enabled by effective and responsive information technology, is critical to success in the current business environment. It is not enough simply to control costs. Successful companies have to constantly re-engineer their processes and periodically re-invent their business models in order to survive.

In 1995, Morag Liddell led the Group's Information Exchange project. She faced the challenging objective of setting up a managed systems integration environment to bind its new hardware and software architectures together. After an exhaustive search, Morag was introduced to Constellar (then called the SQL Group). Seeing the potential in their product, a demonstration of Constellar Hub

was arranged and it passed ScottishPower's proof of concept. David Jones agreed to go ahead and Constellar Hub was implemented in April 1996.

Can Constellar Hub Deliver Real Business Benefit?

While a product which can simplify enterprise application integration has great appeal to IT professionals, in the current business environment it must yield positive, quantifiable business benefits to justify the management time and resources required to implement and manage the product properly.

ScottishPower and Constellar believe the implementation has achieved strategic business benefit. To validate this claim, Constellar asked Ernst & Young Management Consultants to review the implementation. Our aim was to determine the return on investment and to identify the other benefits delivered by the project.

So what has been achieved? Calculating financial returns in a complex systems environment is notoriously difficult. However, by looking at the narrow financial benefits of time saved in systems implementation, Ernst & Young have been able to calculate the Return on Investment (ROI) achieved.

On this narrow definition alone, the implementation of Constellar Hub has achieved an ROI of 237%, with a payback period on the entire cost of the Information Exchange project of one year. ScottishPower estimates that developing interfaces using Constellar Hub is three to five times faster than specifying, coding and testing them in the way they used to do. This is a remarkable achievement considering the newness of the product at the start of the project in April 1996. Moreover, savings and business benefits are ongoing.

Conclusion

ScottishPower has a more controlled, managed and flexible systems environment with Constellar Hub as a key component. This has led to significant business gain. For example, in preparation for deregulation of the electricity supply market in 1998, ScottishPower were one of only four companies ready by the original deadline. Constellar Hub was a significant contributor to this state of readiness.

Over the period of the project, Constellar Corporation has evolved into a software development company specialising in products to help large corporations implement new applications quicker. The company's flagship product remains Constellar Hub.

For companies facing large-scale systems implementation and integration headaches, Constellar Hub offers a solution that should be on your "must consider" list.

Why is Enterprise Application Integration a Hot Issue for CEOs and CFOs?

"IT spending in business areas will rise, but infrastructure spending will be consolidated. This trend heralds a power shift towards corporate officers and away from suppliers and business unit managers."

Gartner Group
IT Spending Patterns: 1997-2002

Business Agility

Business agility has become an essential attribute of success for companies in the current business environment. It is not sufficient just to have control over costs, important as this may be. Successful companies must constantly re-engineer their processes and periodically re-invent their business models. The reasons for this are familiar to all large businesses: rapid technological developments, fast changing consumer demands and intense competition.

In response, companies that achieve business agility will be able to:

1. respond rapidly to competitors and changing consumer demands;
2. ensure that their cost base is as low as possible;
3. achieve a high degree of flexibility to respond to technological changes and, in the regulated sectors, to changes in regulatory standards/regimes.

Business agility is dependent on several factors, but information technology is clearly crucial. Where IT provides "information agility", it is a key enabler of business change. Conversely, it can act as a significant drag on business agility due to the plethora of disjointed systems that many companies operate.

In today's business environment, the core functionality of systems needs to be a given. Management focus in systems development must move away from core functionality towards systems that can support the implementation of more integrated and efficient processes. Furthermore, systems are increasingly required to provide an accurate picture of these activities to managers at all levels quickly, accurately and in a format that is easy to assimilate. Such "information agility" will be determined by the flexibility of systems to adapt to organisational and process changes.

Enterprise Application Integration

Companies need systems improvements now. They cannot wait before seeing significant improvement in systems' ability to integrate, to be more flexible and to provide better management information. In this context, interfacing and integration of systems becomes a critical issue in determining the feasibility, timing and risk with change.

It follows that any software product that significantly improves system flexibility, reduces development costs and increases speed to benefit, merits serious consideration, provided it delivers what it promises.

ScottishPower is a multi-utility company based in Glasgow, UK. Ernst & Young consultants working there were surprised to hear from information systems staff in the company that interfacing of systems for the project they were working on "would not be a problem" due to a middleware product the company used called Constellar Hub.

The comment was of particular interest, as the utilities sector in the UK represents a microcosm of the business challenges facing many companies around the world.

Approximately five months after this initial contact with Constellar Hub, Ernst & Young were asked by Constellar to undertake an independent assessment of the business benefit achieved by ScottishPower in their implementation of the product. With the changes that have taken place in the UK utilities sector, this assessment is of relevance to all companies facing major change.

Lessons from the UK Utilities Sector

The UK utility sector was progressively privatised during the later 80's/early 90's, creating huge change and diverse commercial pressures in a very short period. Since that time, the companies have moved from their "Sleepy Hollow" into one of the most competitive business environments.

The regulatory regimes maintain a constant downward pressure on costs, the gains from which can be wiped out, from a shareholder point of view, at each periodic price review. In parallel, wide swathes of core utilities businesses are being opened up to competition, with intense competitive pressure both from established utility companies and new entrants.

These pressures manifest themselves in, for example, takeover activity, the development of multi-utilities and new customer connection systems. For example, firms have re-engineered the customer acquisition, servicing and retention process. All of these processes have an enormous impact on systems.

ScottishPower have been at the forefront of these changes. They have created one of the largest investor owned electricity companies in the world with market capitalisation of around £6bn and a customer base of five million homes in the UK. They have grown in the UK through strategic acquisitions and moved into other utility services such as gas supply. Over a five year period their turnover has increased by over 99% and the Group Operating profit has more than doubled.

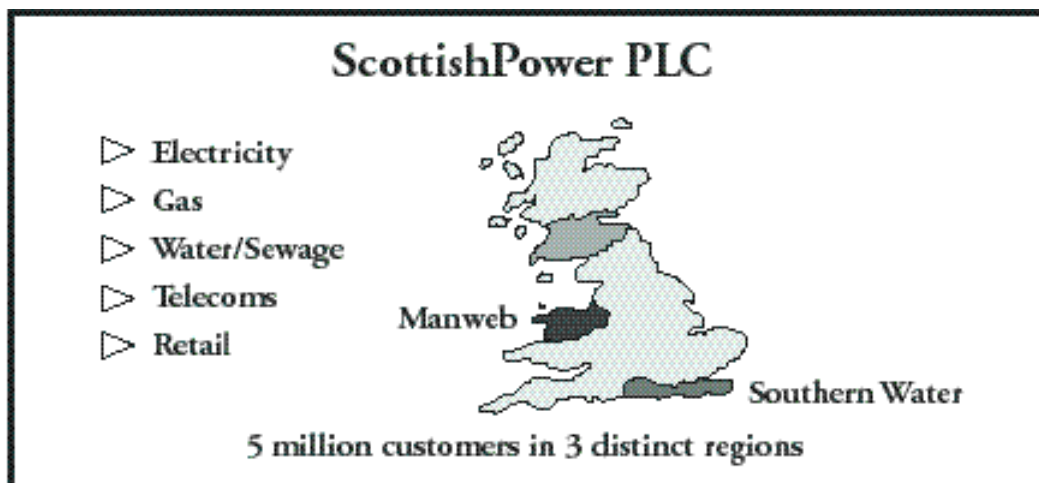


Figure 1: ScottishPower Geographical Area

Enterprise Application Integration at ScottishPower

Given the rapid speed of change at ScottishPower, the apparent control of enterprise application integration and interfacing achieved by the group raises three questions:

- What factors contributed to this achievement?
- How did the Constellar solution contribute?
- Did the product actually deliver qualitative and quantitative business benefits?

The rest of this report details the approach taken to answer these questions and the results obtained.

The Constellar Solution

"..if reducing the IS budget by one dollar has the same effect on net profit as increasing sales by \$13 (source: CFO Magazine, December 1996), IT managers must become more creative in delivering services with smaller budgets and thus help the bottom line."

Gartner Group
IT Spending Levels Do Not Indicate Business Value

The Current Systems Tangle

The last 30 years have seen radical developments in both hardware and software that have significantly changed what systems can do and the way they are implemented. Therefore, systems develop-

ment has had to take place in shifting sands where, even before a project is completed, changes have taken place rendering work obsolete. In addition, systems were typically developed to address one functional area only, with little regard to process integration and management information requirements.

As a result, each company faces a unique set of challenges in attempting to achieve the high level of systems integration and information retrieval now required. Incompatibilities abound, depending on when systems were implemented and the standards then in force. Typically IT managers are faced with problems in reconciling generations of operating system, database and application systems software. Older, host-based applications can't share data with newer client/server relational systems, which in turn can't share with or migrate to PC-based databases and applications. On top of this, data warehouses and data marts introduce a further layer of complexity to co-ordinating scheduled data transformation and movement between systems.

The result of this systems tangle is the requirement for high ongoing IT spend with little apparent business benefit. Key business developments such as mergers and the introduction of new services can also be critically affected, with extended implementation timescales and higher resource requirements.

Constellar Corporation

Constellar Corporation, the Enterprise Application Integration Company, is a leading provider of application integration software and services for large organisations worldwide. Founded in 1988, Constellar developed the first EAI software platform, designed to enable customers to speed up the implementation of new applications and data warehouses, whilst reducing the associated risks and costs. The company's flagship product is Constellar Hub.

Constellar Hub

Constellar Hub is designed as a sole touchstone product to address enterprise application integration issues. It allows the rapid and managed transfer of information between systems that were never designed to work together by routing all interfaces through a central hub.

The benefits claimed from this approach are:

- It allows customers to make better use of existing systems, both in terms of improving cross-system processes and providing management information.
- Ongoing information transfers are more reliable.
- The integration requirements of new systems can be implemented in a quicker and more controlled manner.
- New systems can be "plugged" into the IT infrastructure with minimal disruption.
- It introduces a more disciplined environment, where interfacing costs are lower and much more controllable.

The Constellar solution is targeted at large corporations, such as financial services companies and multi-utilities, which have complex and changing information system requirements.

Implementation at ScottishPower

ScottishPower was one of the first companies to implement the Constellar Hub product in April 1996. Since then, it has been used to develop over 400 interfaces, approximately 200 of which relate to Change 98, a critical business project preparing for deregulation of the electricity supply market. The company has gained considerable experience, not just of the product, but of the factors which are necessary for successful development and management of complex interfacing environments.

While anecdotal evidence from ScottishPower indicates that the product benefits IT developers and operational staff, the key test is, of course, whether Constellar Hub delivers clear, quantifiable business benefit.

Case Study

"I can have two identical Formula 1 cars on the grid, put Michael Schumacher into one and an ordinary driver into another, and we know what the result will be. It's how a product is used that makes the difference."

David Jones
Managing Director, Information Systems Division,
ScottishPower

Company Background

ScottishPower, formed from the former South of Scotland Electricity Board, was privatised in June 1991. At privatisation the company maintained its vertical integration, with responsibility for the generation, distribution and supply of electricity to customers in the central belt of Scotland.

Since then, the company has expanded through organic growth, acquisition and the development of new services. It is now a multi-utility group with a turnover in 1997/98 of £3.1bn. It has 1.8m customers in Scotland, to which it has added 1.3m customers in the North West of England and Wales from the takeover of Manweb, a regional electricity company, and 1.7m from the takeover of Southern Water, which covers Kent, Sussex, Hampshire and the Isle of White.

ScottishPower operates shops and superstores throughout the UK selling brown and white goods, and is the UK's third largest electrical retailer.

The group has also moved into telecommunications. ScottishTelecom supplies advanced telecommunications and on-line information services to residential and business customers, including many of Scotland's clearing banks and major financial institutions, manufacturers, universities and local authorities. In 1998, ScottishTelecom bought Demon, the largest independent Internet service provider in the UK.

The success of the group has, inevitably, put enormous pressure on its systems, which have had to be developed, implemented, upgraded and replaced. Major developments include the introduction of a central call centre in Glasgow and preparation for full competition in electricity supply. This pressure will continue as competition develops in ScottishPower's core markets and the group continues to expand, both within the UK and internationally.

Project Background

ScottishPower recognised that the highly centralised structure it inherited from its pre-privatisation days was impeding the implementation of its strategy. The company undertook a major business review in 1995. This resulted in a new policy of devolved decision-making to the business units and several change programmes to prepare the company for the future.

However, the company was still reliant on traditional, centralised mainframe systems. So David Jones, Managing Director - Information Systems Division, ScottishPower, initiated a major IT change programme which had three strands:

1. removing mainframe systems;
2. upgrading the IT infrastructure;
3. implementing an "Information Exchange".

These supported the revised strategy to devolve decision-making to the business units, enabling them to choose "best of breed" applications to support their business. Meanwhile, all the interfacing requirements to other systems in other business units are done through the Information Exchange.

Information Exchange Project

The Information Exchange (IE) project was initiated in September 1995 under the leadership of Morag Liddell. The project team were set strict criteria that any solutions they proposed would have to satisfy:

1. It should make minimal changes to the packages implemented.
2. It should be "plug and play", relatively easy to set up but integrated and flexible.
3. As systems would be selected by the business units, any solution would need to cope with interfaces that were continually added, removed, exchanged and enhanced. Data and technical architectures would be different, as would the service level required of different interfaces.
4. All systems should be interfaced to a central point, that could be properly managed.

Product Selection

Having established the solution criteria, the team then looked to the market place. IBM was selected to be their interfacing partner, but neither they nor their competitors appeared to have a product that could meet the criteria.

At that point, Morag Liddell was made aware of Constellar. Their product, at that time named Information Junction, was being marketed primarily as a data conversion tool, but passed ScottishPower's proof of concept for a systems integration tool. Consequently, Information Junction was selected as the basis for the IE project and initial implementation took place in April 1996.

The IE implementation project was disbanded a year later, in April 1997, having successfully completed its task. By that time the product was fully operational and regarded as another development and production tool by the company, albeit a critical one. Virtually all new interfaces are set up using Constellar Hub.

ScottishPower regard the key differentiators for the product as:

- It is a strong management tool.
- It has powerful scheduling capabilities.
- It does not require proprietary technology or a data warehouse.
- It is simple to use.

It enables interfacing to be driven by business rules rather than technological requirements.

Benefits Achieved

Significant benefits arise when business projects are implemented quickly, both in terms of cost savings and revenue generation. However, a wide variety of factors impact on overall project costs and timescales. Therefore, for the purposes of this study, the quantification of financial benefits has been restricted to those that can be attributed directly to Constellar Hub. Full details of the approach are given in Appendix A.

Financial Benefits

The Return on Investment achieved by Constellar Hub implementation at ScottishPower was 237% with a pay-back period of one year. This is a remarkable achievement for such an ambitious project using a new software product.

The information exchange process, including interface specification, development, testing and day-to-day operations, is run by a team of 14 people.

This is less than would be expected in a group of equivalent size and complexity, indicating that ongoing savings will be achieved beyond the period evaluated in this study.

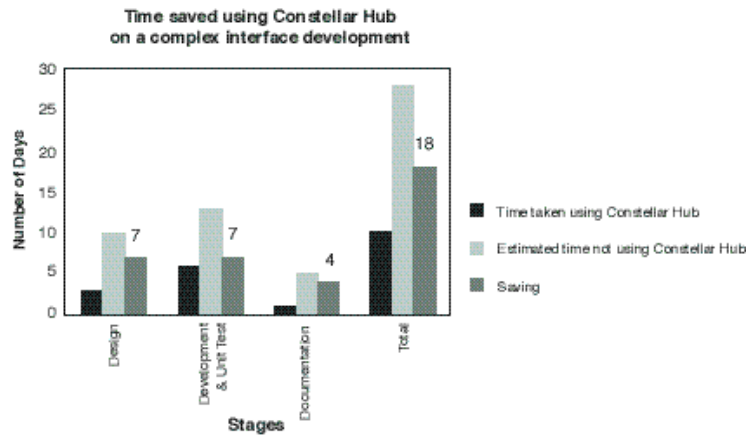


Figure 2 : An Example of Typical Time Saving Using Constellar Hub

Other Business Benefits

A consistent message from the people that Ernst & Young spoke to at ScottishPower was that the non-financial benefits of the implementation were of even greater significance than the financial. These key benefits are summarised below.

Rapid response to competition

- Constellar Hub was a significant factor in ScottishPower's claim to be the first company ready for the introduction of competition in UK electricity supply, and to be one of only four companies ready by the original deadline of April 1998.
- This ability to respond rapidly to competitor strategies and embrace consumer demands is enabled by the "plug and play" architecture, which significantly improves systems flexibility. Improvements can be made using existing systems, and then individual enhanced or new components "plugged in". Meanwhile the overall integrity of the enterprise architecture is maintained.
- The achievement of a standard approach to interface development enabled ScottishPower to develop over 400 interfaces in two years with a team of 14 people.

Ability to integrate rapidly systems from acquired companies

- Scalability is a key feature for ScottishPower, allowing the absorption of much increased transaction volumes from major acquisitions, with minimal disruption. This contributes to the speed with which shareholder benefit is realised.
- The ability to structure across multiple Constellar Hub databases and implement across distributed hardware provides the flexibility to accommodate major business changes quickly and reliably.

Availability of quality management information

- The Information Exchange project has greatly enhanced data consistency, as data cleansing and transformation is carried out as a matter of routine. This means managers can place greater reliance on the information they receive.

- Data transfers are completed in managed and coordinated manner and interface "spaghetti" is prevented. Accurate operational and management information is available when needed.
- ScottishPower is able to implement distributed systems/data bases with confidence that key data elements can be maintained consistently across them.

Reduction in system development timescale and risk

- A standard approach to interface development has been achieved which reduces the time and risk for systems projects. Planning is enhanced as interfacing issues are not left until they become major problems but are tackled up-front.
- The ability to replace packages or applications without having to change systems or build new interfaces provides the IT flexibility to support business agility, enhance speed to benefit and reduce development costs.
- The fact that interfaces can be developed, operated and maintained by a small team of staff working to common standards enables fast and reliable time/resource estimating followed by quick and consistent delivery of critical interfaces. It also significantly reduces the dependency on particular individuals with specific, usually undocumented, knowledge when changes have to be made in the future.

System and Supplier Independence

- As there are no dependencies between source and target systems, ScottishPower is not tied into specific hardware/software architectures. This enhances speed to benefit of systems development, lowers risk and significantly improves the ability to use data from existing systems quickly.
- The ability to accommodate different system solutions within IT architecture provides flexibility to select software to meet business needs. Integration/ interfacing can be achieved without the need for major software changes thus gaining significant speed to benefit.

How Were These Benefits Achieved?

As in any successful project, there were several critical success factors.

Clearly, Constellar Hub's fitness for purpose and its stability under operational conditions were critical to the project. Without such a product, it is difficult to envisage how the project could have delivered its original objectives.

However, a good product does not in itself guarantee success. A disciplined integration environment was also critical in achieving the project goals. The project established certain key principles that contributed to its success:

- The interfacing process had to be owned by the businesses, not IT. Therefore, from the outset, the team insisted that the holders of the source and target data had to agree to the business rules that would determine the interface specification. IT acted as enablers, not owners.
- The project would deal with near time interfacing only. If real time interfacing were required, it would have to be developed and paid for separately. Although managers tended to assume initially that interfaces needed to be real time, this proved not to be the case and virtually all new interfaces are "near time". This has significantly reduced the complexity of the interfacing environment.
- Data needed to be transformed as it moved between systems, not just transferred. The capability to do this was a crucial piece of product functionality and has been built into the standard interface specification and build process.

Conclusion

The Information Exchange project has been a success in meeting its initial challenging objectives, and in delivering financial benefit to the company.

This was achieved through a combination of product and organisation. Constellar Hub proved to be a key enabling technology, which plugged a critical gap in the systems architecture. Meanwhile, ScottishPower managed the implementation process in a disciplined way.

The company is able to add, delete, modify, scale up and scale down systems and know that systems integration can be achieved in a rapid and controlled manner.

Managers can no longer afford to be at the mercy of technology. If a solution doesn't work quickly and reliably, its value has to be questioned. Constellar Hub should be on companies' "must consider" list when looking for solutions to the inter-application spaghetti problem.



Water, Electricity Distribution & Supply and Domestic Gas

Ernst & Young is the world's leading professional services firm providing a full range of change management, accounting & audit, management consultancy, taxation, assurance, corporate finance and privatisation services.

This study was undertaken by the firm's Utilities Group, which specialises in serving utility, multi-utility and new entrant clients across the water, electricity and gas sectors. The Group has specialist experience and expertise with many leading utility companies across the areas of strategy, technology and operations in

- operational 'best and next practice';
- regulation strategy and policy; and
- programme implementation and management.

Appendix A -

Approach to Case Study

Attempting to quantify benefits from software tools used in complex IT environments is difficult. It has to be approached with considerable caution, as there are many variables affecting the benefits achieved.

Potentially, a wide range of benefits may be achieved from a software tool that reduces interfacing/integration timescales, ongoing maintenance costs and subsequent amendments or replacements. For example, bringing new systems on-line faster means that new services are implemented more quickly and revenue streams are enhanced.

Estimating these benefits involves a degree of subjectivity. Furthermore, it is not necessarily of value when comparing across companies and sectors since the circumstances are so different. Therefore, the approach taken to benefit quantification has been to:

1. quantify the claimed improvements in development time, ongoing maintenance and operational costs;
2. estimate the resource requirements for achieving the same level of interface development using individual, point-to-point interface development;
3. quantify the revenue costs of both approaches over a three year period;
4. calculate the ROI and payback period.

Restricting the financial benefits calculation to this narrow definition achieves three objectives:

1. The results are more reliable.
2. Companies can tell whether implementation of the product can achieve a positive return in its area of direct functionality.
3. The results provide a better benchmark for other companies.

However, it is clear that ScottishPower has achieved wider business benefits from the Information Exchange project. While these cannot reliably be quantified in financial terms, the time and resource savings achieved have been detailed.

Calculation of Financial Benefits

The method selected to estimate the quantifiable financial benefits was Rate of Return on Investment (ROI). In addition the payback period for the investment made was calculated. Full details of this calculation appear in Appendix B.

Information Gathering

Information gathering was carried out by interviewing key ScottishPower staff involved in the Information Exchange project, the ongoing IE function and ISD finance as follows:

David Jones (Managing Director, Information Systems Director)

Morag Liddell (Special Projects Manager)

Ellen MacDonald (Information Exchange Team Leader)

Elaine Barrie (Information Systems Finance)

William Edwards (Finance Manager Information Systems Division)

John Girvan (Information Exchange Manager)

From these interviews, it was established that, over the review period, 420 interfaces have been set up using Constellar Hub. Of these, approximately 200 related to Change 98, a critical business project preparing for electricity supply competition.

Assumptions

Experienced IT staff developed working guidelines for the time taken for each interface development using Constellar Hub as follows:

- simple interface 5 person/days
- moderate interface 10 person/days
- complex interface 15 person/days

These times cover the full process from analysis of requirements through to delivery of the interface into the production environment, including end-to-end testing and documentation.

Their definitions are as follows:

Simple interfaces are those which involve straightforward file to file transfers with no modification of data, but include different record structures between source and target files.

Moderate interfaces would include file to file or database to database transfers which involve some logic to accept or reject particular records and/or some record modification.

Complex interfaces are those which involve multiple record types and/or more complex logic in the transfer.

ScottishPower estimate that 45% of the interfaces they develop are simple, 45% moderate and 10% complex. They also commented that, as the team has become more experienced, they have become quicker at developing interfaces.

Based on the 420 interfaces completed so far, this would equate to 3,465 hours (see Appendix B for detailed calculation).

To check the accuracy of these guidelines, detailed information about IE staff time inputs, from project initiation to September 1998, was obtained. This information detailed hours logged (by timesheet) for each project for each individual. Hours are not broken down to individual interfaces.

This provides an initial check that the broad estimates provided are within acceptable levels of accuracy.

The next stage was to derive estimates of the resources and time required if alternative approaches had been adopted. ISD's own estimates are that developing interfaces using Constellar Hub is three to five times faster than specifying, coding and testing them in the way they used to do.

In order to test this, details of six interfaces were obtained: three simple, two moderate and one complex. The details were checked by Ernst & Young experts, who gave an estimate of the amount of time which they allow for developing the interface using traditional methods. This process confirmed that time savings in the order of three to five times were being achieved.

To establish base costs for the project, financial ledger prints were obtained and total external costs for the project were extracted. The project had been subject to two external audits during its progress. The costs of these were excluded, since they were optional, but all other costs have been included.

Internal staff costs have been excluded since most of the input was on interface development and hence has been taken account in the ROI calculation. Of the remainder, much of the time allocated relates the general Information Exchange activities and would have been incurred whether Constellar Hub had been selected or not.

Appendix B -

ROI Calculation

The ROI in the Constellar Hub product was evaluated as follows:

Timeframe

The Information Exchange project was initiated in September 1995. Implementation of Constellar Hub started in April 1996 and was completed in April 1997. For the purposes of this study, costs and benefits have been obtained up to September 1998 and then a projection for the six months to March 1999 added to give a three-year period. This is the minimum which can reasonably be used to assess a strategic investment of this nature.

Base Costs

Base costs information was checked back to source reports. This gave total external costs for the project of £1.17m. Not all of these costs are directly attributable to the Constellar Hub product, as the purpose of the project was to set up a controlled interfacing environment. However, since Constellar Hub was the key enabler, for the purposes of the ROI a conservative approach has been taken and all these costs are assumed to apply to the implementation.

Resources & Timescales

Over the review period, 420 interfaces have been set up using Constellar Hub. It is not possible to evaluate each of these individually but ScottishPower has developed working guidelines as follows:

- simple interface 5 person/days
- moderate interface 10 person/days
- complex interface 15 person/days

In broad terms, they estimate that 45% of their interfaces are simple, 45% medium and 10% complex.

This gives resource estimates as follows:

simple	$420 \times 45\% \times 5 \text{ days}$	= 945 days
moderate	$420 \times 45\% \times 10 \text{ days}$	= 1,890 days
complex	$420 \times 10\% \times 15 \text{ days}$	= 630 days
Total		3,465 days = 17.3 person years

The Information Exchange team consists of 14 people: two team leaders, two design coordinators,

and 10 people who actually develop the interfaces. The first interface came on stream in August 1996, so the 420 interfaces have been developed over a two-year period. Allowing for initial ramping up time for the team, the overall estimate of 17.3 person/years equates closely to the resources within the team.

ScottishPower believes that the product allows them to develop interfaces three to five time faster than using hand coding. To test this, a sample of specific interface developments was looked at: three simple, two moderate and one complex.

The times taken were as follows:

simple - 1.2, 3.5 and 0.8 days

moderate - 2.5 and 5 days

complex - 10 days

Each of these sample times was well within the resource working estimates given. However, the sample size is very small and in order to test the information given we obtained timesheet data for times charged to specific interfacing projects.

These data were reviewed by Ernst & Young interfacing experts to establish estimates of the time required if the interfaces had been hand coded. They have confirmed that savings in the order of three to five times faster are being achieved over expected times for similar interfaces using hand coding.

Return on Investment

ScottishPower Constellar Hub ROI Calculation

$$\text{ROI} = \frac{\text{PV of Benefits}}{\text{PV of Investment}}$$

Discount Rate = 5%

PV of Investment over 3 years

	Year		
	96/97	97/98	98/99
Investment	£945,824.43	£218,081.74	£104,253.81
PV of Investment @ 5%	£1,188,650.10		

PV of Benefits over 3 years

Saving per interface £9,375

	Year		
	96/97	97/98	98/99
Number of Interfaces	120	200	152
Benefits	1,125,000	1,875,000	1,425,000
PV of Benefits @5%	£4,003,077.42		

$$\text{ROI} = \frac{\text{PV of Benefits}}{\text{PV of Investment}}$$

237%

CONSTELLAR.

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