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Innovation in the software industry: two case studies

By Martin Wynn, Shujun Zhang, Hongnian Zang and Paul Morgan

Abstract: *This paper examines how two small companies adopted new business strategies to exploit the market opportunities for web-enabled software. The first case study (Beaumont Travel) transformed itself from a bus company into a software house for the transportation industry, producing software modules for central daily business management functions and field-bus passenger and vehicle maintenance information. In the second case study, a small software house (QEB Solutions) saw the opportunity to develop web portals to existing back-end systems, and has worked with a range of customers to develop a new revenue stream that will support the company in future years. Both these business projects were undertaken via the Knowledge Transfer Partnership (KTP) scheme, which supports university academics working with industry on strategic projects.*

Field of Research: E-business, innovation, software development

1. Introduction

Innovation is at the heart of government policy for re-invigorating and supporting British industry, and technology diffusion is an important means for achieving increased competitiveness, particularly for small to medium sized businesses (SMEs) (La Rovere, 1998). However, several authors have highlighted that lack of finances and basic technological capability can act as barriers to SMEs adopting new technologies both in-house and in applying it in their products and industry sectors (Jones-Evans, 1998). Brychan (1999) has underlined the importance of technology transfer networks in helping SMEs adopt new technology, particularly those where technology is transferred into an SME from an external source. In this context, the Department of Trade and Industry (DTI) specified a range of products for supporting and promoting innovation, particularly in the field of technology development and application. (DTI, 2003). One of these products is the Knowledge Transfer Partnership (KTP), which provides direct support of circa £25 million per annum for graduates to undertake specific knowledge transfer projects in firms of all sizes, but particularly in SMEs of less than 250 staff (Wynn and Jones, 2006).

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It is the deployment of this scheme to introduce new web enabled software products in two software houses - both SMEs - that is the focus of this paper

2. Innovation in the software industry

The software industry is steeped in product and concept innovation, emanating from both large and small enterprises. Small software firms are often forced to innovate because of the highly competitive nature of the industry. Audresch (1995) notes that 'those new firms that are able to adjust and offer a viable product apparently experience higher rates of growth and a greater likelihood of survival'. Macpherson (1997), referring to small manufacturers, has noted that these firms have become 'increasingly adept at scanning the external input environment in an effort to identify new product ideas, new industrial processes or new market opportunities'. The external environment for software houses is perhaps more rapidly evolving than most, with new technologies creating new technical environments that require re-work and upgrade of mainstream products on a regular basis. This has meant that innovation is often necessary to survive. Lawless and Anderson (1996) assert that 'an innovation imperative must be one of the priorities of firms in accelerated markets', and in small software houses this is often kick-started through alliances with third parties. Rai et al (1996) note that 'strategic alliances provide an effective means to improve both the economies of scale and scope offered by traditional modes of organisation', and this is evidenced in these two case studies.

3. The Knowledge Transfer partnership (KTP) Scheme

The KTP scheme can be used for any project that gives strategic bottom-line benefit to the company partner, but it is often geared to projects that inject innovation and/or new technology into the operations and culture of the company. Essentially the UK government will fund over 50% of the employment, training and support costs of an experienced graduate (called a KTP Associate) to lead these key change projects, and in addition, the government funds consultancy from University academics to support the project and bring transfer of new knowledge from university to the company. The general aims of KTPs are to:
- Improve the competitiveness of the company,
- Enhance the business knowledge and understanding within the university, and
- Advance the career prospects of the KTP Associate.

The partnerships involve the Associate working in an organisation, normally for two years duration. During this period an academic from the University is assigned for 20 days per annum to support and supervise the project, and bring in specialist knowledge and expertise as appropriate to ensure project delivery. The benefits to the company include the potential identification of new opportunities for development and growth, and the stimulus to research their outcomes. KTPs also provide dedicated additional resources to enable organisations to deliver project benefits; and they allow organisations to access new developments in specialist fields and to exploit innovative concepts and thinking in business.

Universities can derive a number of collective and individual benefits from participation in KTPs. Many of these derive from the use of KTP projects as case studies for both teaching and research. The case study method is well established as an educational technique in both higher education and continuing professional development, and some of the documented case studies coming from KTP projects can be used in both situations. For teaching-led universities, which nevertheless have a clear commitment to research-informed approaches, KTPs offer particular benefits in providing new and interesting materials for inclusion in the curriculum. KTP projects also provide opportunities for academic staff to work on live business challenges, which allow them to maintain an up to date knowledge of business thinking and methods.

4. Case Studies

4.1 Beaumont Travel, Gloucester

Background
Beaumont Travel was a well-established bus and coach company with 36 staff and a turnover of £1.1m in 2005/6. In the early years of the millennium, the company had developed bespoke software for its own use geared to the specific requirements of the industry, but they had also generated some interest from other operators in the purchase of this software. However, they lacked the development skills needed to progress their in-house modules and outline concepts into fully configurable, integrated software for sale to the transportation sector. The company were thus in need of technical and project management skills and looked to the University of Gloucestershire and the KTP scheme to support them in developing this new software as a new line of business. What in fact followed was a transformation of the company from a bus company to a software house specialising in the new products geared to the transport industry. The areas of expertise that the Associate and academic supervisor brought to the company included:

- Design and development of e-business systems using web-based technology such as Linux, Apache, PHP, MySQL, HTML, JavaScript, CSS and GTK, Microsoft.Net and Dream Weaver etc.
- Full systems development life cycle planning and implementation (eg SSADM).
- Integration of software modules with core systems such as ERP, CRM and SCM.
- Project management skills and experience
- Business strategy and e-business strategy planning and implementation.

The Project
The project initially focussed on market research (through questionnaire, interview, survey, and systems user reviews) to understand and reaffirm the key business requirements in the bus & coach industry. This was followed by the analysis, modelling and optimisation of mainstream business processes in the industry, which eventually was the platform for a web-based solution with open-architecture to allow the applications to be used, not only in the transportation

industry, but also in SMEs in other industry sectors. The software was built around a new database-independent central core system (TravelManager) that is web based with simple connectivity for customers operating across the Internet. The TravelManager system encompasses modules for central daily business management, field-bus passenger and vehicle maintenance information. Interface modules have been added to allow information exchange between TravelManager and other third party systems. These modules were alpha and beta tested with prospective customers leading to modification of some functions of the system to meet the individual customer's business requirements. A significant breakthrough came in the post-development marketing of the product, as BT selected a modified working version as the central customer relationship management (CRM) elements of the system for SMEs (this has been re-badged as BT BizBox). The systems architecture for TravelManager and BT BizBox is shown in Figure 1 and the information flow is shown in Figure 2.
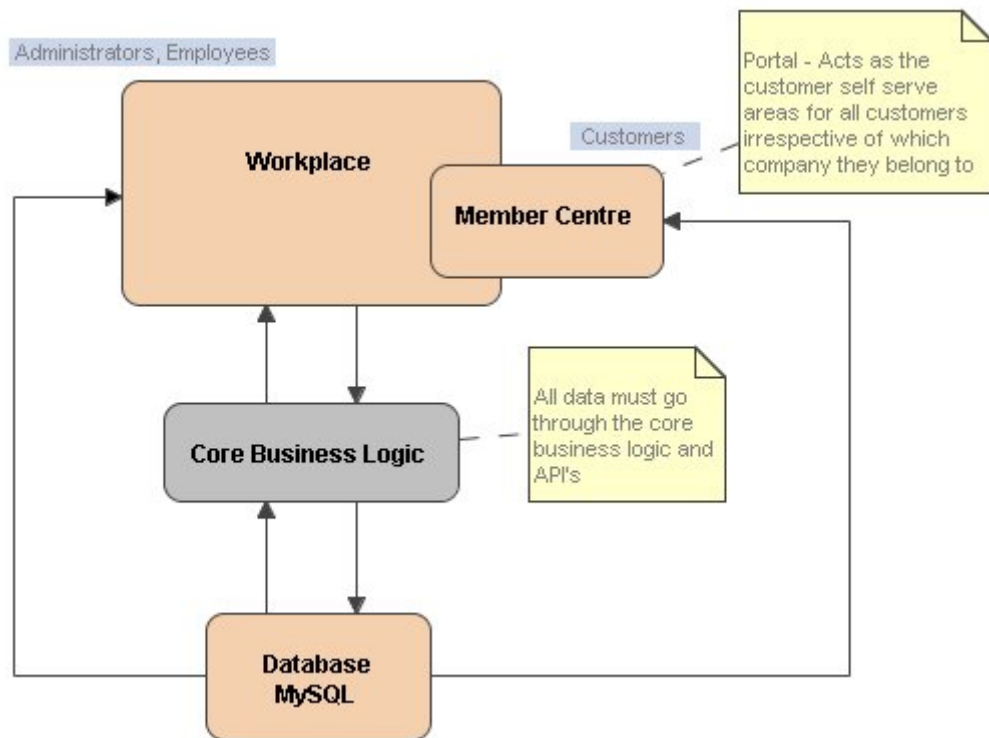

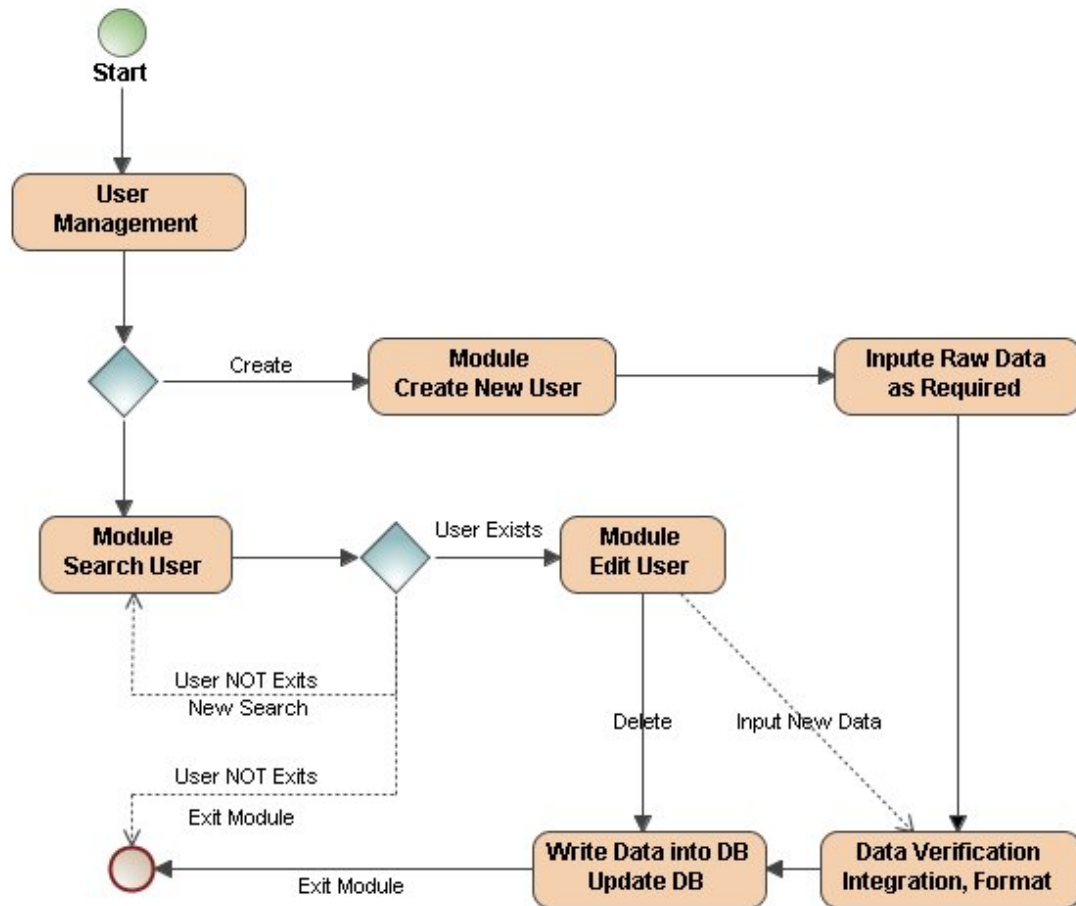**Figure 1. Systems Architecture for TravelManager and BT BizBox**

Figure 2 Information flow for TravelManager and BizBox products

The outcome

Beaumont Travel has been successfully transformed from a traditional bus and coach service company to an advanced IT company. The new knowledge gained from the project has significantly enhanced the company's ability to design, develop and market comprehensive web-based packages – Beaumont Travel is now a software developer and service provider. The KTP project greatly enhanced the company's capabilities in web based software design and development, as evidenced by the company's success in securing a key contract with BT. Feedback from customers using TravelManager clearly indicates that their operational efficiency has improved.

Several other benefits resulted from this programme and can be summarised as follow:
- Improved knowledge transfer within the organisation
- Assistance in creating a 'new technology culture' within the organisation
- Better decision making at the commercial/technological interface
- Assistance in enabling multi-skilling of employees

Based on a review of its future business strategy, Beaumont Travel is now aiming to design, develop and market its systems with open architecture that allow flexible function add-ins and configuration not only for the transportation industry but also for SMEs in many other industries. The marketing strategy is

now focussing on longer-term returns, with over 300 customers trailing TravelManager and more than 260 for BT BizBox. Revenue estimates for the next two to three years are in excess of £1m per annum.

4.2 QEB Solutions, Hereford

Background
QEB Solutions is a software house generating revenue from the delivery of bespoke and packaged web based products. In 2005/6, the bulk of company turnover came from the sale of its Nebula product, which is used by client companies as an intranet, information portal and communications management tool with end customers. This came from a small number of key customers, including PPML (now part of Capita SIPP Services), UK Offshore Oil Association (UKOOA), Allpay.net and Suffolk Life.

In 2006/7, the company revised its business plan to move away from purely bespoke adaptations of their Nebula information portal, towards a company specialising in a market leading packaged product especially geared to the financial and related service sectors. Initially, further module developments of the Nebula product were considered, but following the development of an alliance with Cambridge Online Systems Ltd (COSL), the company moved towards building custom built web portals for key customers running Microsoft Dynamics (previously called Navision) as their core backbone system. The KTP project was key to implementing this business transition as it delivered the first attempts at design and development of web portals in this niche market.

The Projects
QEB Solutions had worked for a number of years for a customer called Suffolk Life. Suffolk Life sells through financial services companies with many branches around the UK and recently embraced the idea of sharing its data with other parties when they entered into new partnerships with the Prudential, Norwich Union, and another well-known financial institution. The partners sell products administered by Suffolk Life through their established adviser channels; however the partners wanted their advisers to access these plans through their web site. Additionally to attract potential investors, the solution was to have fund supermarket trading fully integrated

The solution involves a highly secure architecture. Users from Partner sites are directed to Suffolk Life's website, using the Partner's authentication, so the users don't have to re-login. Users transparently access pension data held in the Suffolk Life back office systems. As they access the web pages they are dynamically branded. The net effect is that the Partners investment is minimised but they have access to the whole solution. Once access to the site is provided, Partners and Advisers can view all their plans administered by Suffolk Life. Advisers can additionally buy and sell unit trusts online, through a real time web service connection into a fund supermarket. Data is exchanged between the website and their back office systems (Microsoft Dynamics-NAV). All exchanges are performed securely via web services using XML.
Strategically, Suffolk Life has been able to open new distribution channels, offering its services through partners. Additional business has been achieved

without an exponential growth in headcount. Operationally, Suffolk Life has provided access to their plan data through these channels in a way which simply could not have been achieved without the use of the Internet. And the business partners get the benefit of Suffolk Life's web services, without having to replicate the functionality themselves.

Importantly, advisers can now access information 24/7, making life easier for them. Suffolk Life are now witnessing increasing volumes of web-based enquiries, alongside greater use of the online fund supermarket dealing service. 24/7. Suffolk Life can now handle significantly increased volumes of new business, whilst continuing to provide their award-winning high quality service.

Building on the experience at Suffolk Life, the web portal and middleware products were further deployed at a second customer – Education Personnel management (EPM, see Figure 3). Education Personnel Management (EPM) provides personnel services, consultancy and training to a large number of Primary, Secondary, Academies, Special, Foundation, Aided and Community schools. EPM has extensive expertise, experience and understanding of personnel issues in schools and can help schools achieve the high level of staff management expertise necessary to achieve a successful school. EPM provides these services to hundreds of schools across the UK, ensuring tens of thousands of education sector employees are paid timely and accurately every month. EPM concluded that these working practices could be greatly improved with the use of the internet, and a new e-business strategy was developed to facilitate access to EPM's services over the internet via a secure portal enabling the schools to maintain and view their information in EPM's back office systems (Microsoft Dynamics –NAV).

The portal is a secure, confidential web site that will only be accessed by the Head teacher and authorised staff. To use the site, schools are required to follow a quick and simple registration process to ensure that only authorised users have access. The project went through the normal development life cycle, with the Associate documenting and analysing EPM's requirements and developing a functional specification in mid-2007. The web portal was developed using .Net technologies and installed using QEB's Message Broker service for SQL Server 2005. Key Features of the new web portal include:
- Flexibility to access from anywhere via the secure login
- Ability to submit details of New employees and their contracts
- Ability to view specific Employee Details/Contracts and amend as necessary whenever needed
- Ability to view submitted data and track progress of transactions
- Ability to download data flexibly for reporting purposes
- Highly auditable and secure service
- Submit overtime for staff
- Submit expenses for payroll
- Confirm Absence due to Sickness & Holiday
- Review Payroll Schedules & Runs
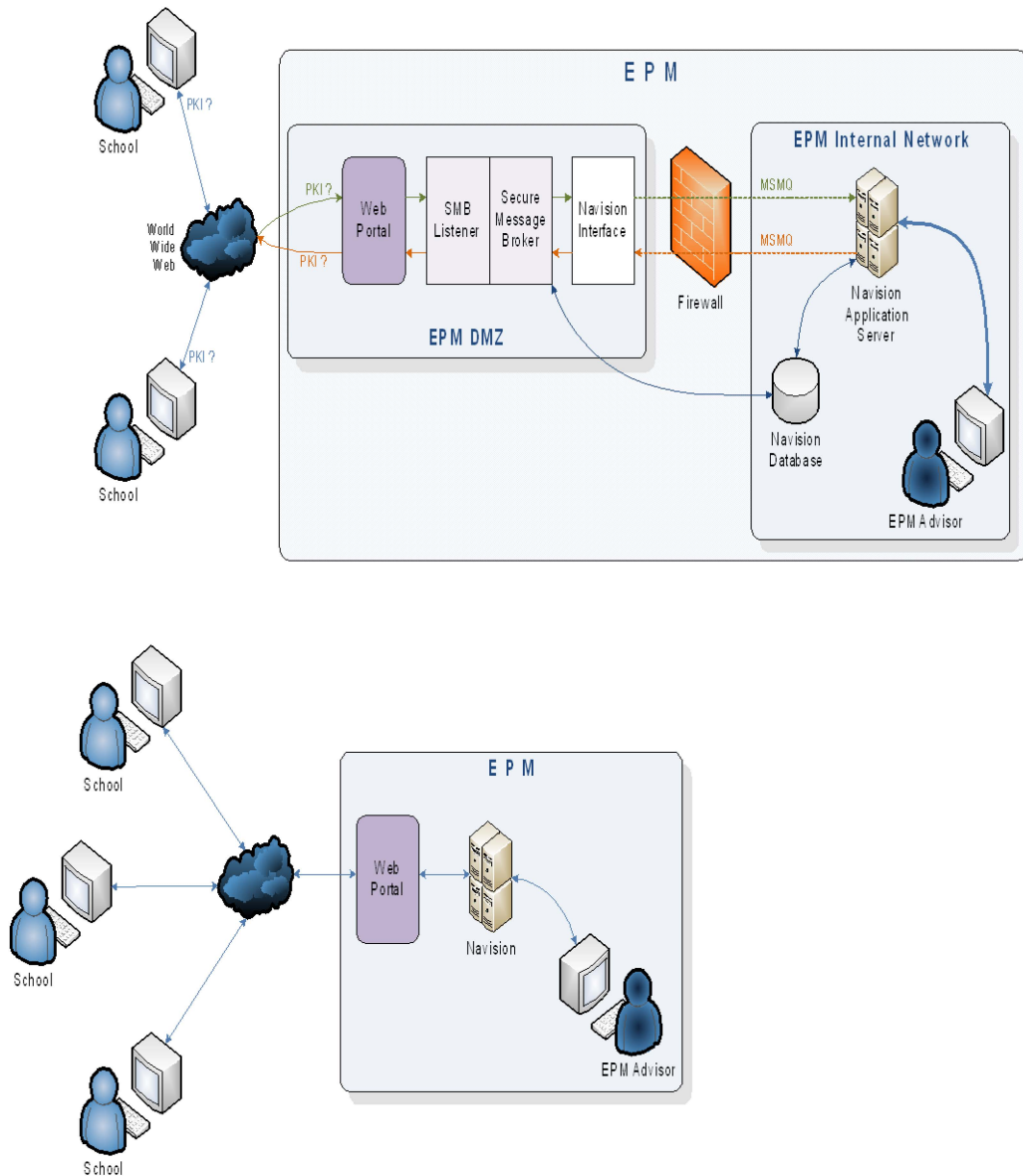- View Employees Payslips & P60

Figure 3. Web Portal architecture for Education Personnel Management

Eventually employees will be able to review their own employment details and interact directly.

The schools will also benefit by having:

- greater visibility of their information by the school (remove)
- 24x7 access to that data

- greater accuracy of information
- readily available access to statutory required information

The outcome

QEB Solutions now have a foothold in the web portal market linked to Microsoft Dynamics and it is expected that this type of development will provide a major income stream in the coming years. Key to the success of the developments at Suffolk Life and EPM is an understanding the role of 'middleware' software in client companies' information systems architecture. An important issue for many service companies is that their core corporate data is held in internal software packages, and is often not readily available to business partners via their websites. Companies in this sector have thus tended to have problems with systems integration and have resorted to third party 'middleware' products to link systems together. These products are now emerging as very significant in overall systems strategy. They generally have no direct user interface for the end-user, but act as a 'funnel' for the transport of information between applications, and provide a key link mechanism between the web-based portal and in-house information sources. One solution is to use Microsoft Dynamics as the main corporate system, with QEB's middleware and portal products providing web access for key customers and their business partners.

As the scope and scale of QEB Solutions' business grows, the company is looking to benefit from the knowledge and experience of working with other organisations. The new web portal developments have deployed ASP. net, VB.net and SQL Server 2005. Knowledge transfer has been multi-faceted and at various levels, providing the company with a new strategic direction, and the Associate, who gained his Microsoft Technical Certified Specialist (MCTS) qualification in the course of the project, with a new career path.

5. Concluding Remarks

Both Beaumont Travel and QEB Solutions illustrate how SMEs can innovate to create new business opportunities. Although Beaumont's transition to a software house appears more radical (Figure 4), they had in fact been prototyping software for some years and using it in-house in the bus company.

As Utterback (1994) has noted, 'incremental innovation is clearly of critical economic and competitive importance, especially when investment in radical innovation is difficult to justify'. In the context of e-business developments, Davydov (2001) has noted that 'the challenge is to integrate the whole set of enterprise wide applications into a single integrated information network'. A key question for systems users is *how* to actually achieve this. The type of software being produced by the software houses featured in this article focus on the use of web technologies to achieve integration. Gartner have stated that the market for this type of "net centric" software is expected to grow into a $3bn industry within the next 12 months and grow at 45% per annum for the next 5 years. Through transitioning their company businesses to new products, both QEB and Beaumont Travel are now better placed to benefit as this market develops.
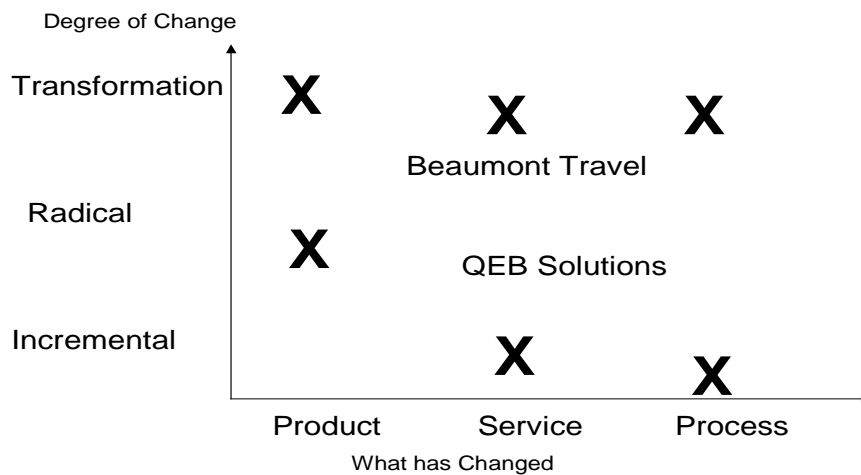
Figure 4. Innovation – What has changed and by how much?

As regards the KTP scheme, it has consistently delivered major business benefits for companies working with local universities across the UK for over 25 years. Indeed, in recent years, the scheme has brought an average bottom-line benefit of over £200K per annum (DTI, 2006) to the companies participating in the scheme. It brings government funding to enable organisations to take advantage of the wide range of expertise available within universities, and these case studies highlight the potential of the scheme to introduce innovation as well as bottom-line benefit to participating companies.

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