

The potential for using information systems to enhance information flows and relationships in the intellectual property sector: The case of Kennedys Patent

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Abstract

This paper investigates the potential use of information systems (IS) for enhancing the supply chains of organisations positioned in the intellectual property (IP) sector. Exploratory research has been conducted through the lens of a patent and trade mark agent who is involved in advising on a range of IP issues. The research highlights the opportunities offered by IS (including online technologies) for generally improving the provision of business services e.g. automating supply chain processes. More specifically, though, it investigates the potential IS have for integrating information flows and providing timely, in-depth and better presented information and the options for online filing. It also explores the capabilities for improving interactions with clients and enhancing relationships with key stakeholders in the supply chain e.g. government agencies, overseas patent agents and lawyers. The paper additionally outlines key challenges that are at the forefront and need to be addressed when using IS within the IP sector such as identity management, security and authentication. The key findings of the research will be of value to researchers and practitioners in the IP field but many of the issues and challenges faced will also be applicable to other sectors.

Keywords: information systems, intellectual property, supply chain, information flows, relationships; e-business; e-government

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1 INTRODUCTION

Current developments in information systems (IS) have focused heavily on the Internet and the World Wide Web (www). Furthermore, the proliferation of the Internet in the 1990s has given rise to E-Commerce and E-Business. E-Commerce relates more to the online buying and selling of goods and services. E-business includes e-commerce but covers a wider application of online technologies to an organisation's front end and back end processes (Kalakota & Robinson, 2000). E-business exploits many technologies such as the Internet, intranets, extranets, e-mail, electronic data interchange (EDI), Enterprise Resource Planning (ERP), document management systems and portals: and so on. A further application area which has grown significantly in recent years has been E-Government which relates to the government's use of online technologies for transforming services, exchanging information and interacting with citizens and businesses. Generally, IS and in particular online applications, are playing an increasingly prominent role in the management of organisational supply chains. Supply chains are networks of organisations and the related business processes involved in the production and delivery of goods and services (Laudon & Laudon, 2006). IS are being used for enhancing the management of these supply chains in terms of streamlining key business processes, improving information flows and enhancing relationships with key stakeholders.

In tandem with the rise of the Internet and the so-called 'knowledge economy', another societal trend has been a growing awareness that intellectual property (IP) can be, and should be, managed strategically for creating and sustaining competitive advantage (Davis & Harrison, 2001; Hemphill, 2004; Thumm, 2004). The term 'intellectual property' refers to rights which relate to, most commonly, "patents, copyright, designs and trade marks" (Gowers, 2006, p13). The effective management of IP requires an awareness of the legal and regulatory framework(s) across a number of jurisdictions and may necessitate the specialist expertise and experience of IP specialists such as patent agents. Patent agents are a form of professional service firm, and a subset of the legal services sector. The technical, commercial and legal nature of IP (and specifically patents; Bently and Sherman, 2004) requires significant skills to undertake the process of creating and managing such intellectual property rights (Gordon et al, 2006). This context provides firms in the sector with the opportunity to adopt IS/e-business for increased effectiveness and competitive advantage, and also the prospect of enhancing the relationships with government agencies through e-government related initiatives.

The purpose of this paper is to explore the potential for using IS for strategically managing organisational supply chains, information flows and relationships in the IP sector. In particular, the paper is based around a case study of a patent and trademark agents - Kennedys Patent (shortened to 'Kennedys'). Registering a patent is complex, and involves the exchange of information between a number of stakeholders. The patent supply chain involves a range of different processes, different organisations such as clients, patent agents and patent offices and many internal and external information flows. Traditionally, the process has been principally paper-based. However, many jurisdictions across a number of areas of law have become aware of the opportunities offered by the advent of e-business technologies to instigate electronic online filing (eOLF) of documents (see for example UK Patent Office, 2006; European Patent Office, 2005). The patent supply chain is expanded upon in Section 2. The insights provided by Kennedys have arisen from the authors' collaboration in a DTI funded Knowledge Transfer Partnership (KTP) Project between Kennedys Patent and Glasgow Caledonian University. Kennedys Patent was founded in 1997 and now has offices in Glasgow, Newcastle and Aberdeen, employing a total of 18 fee-earning staff and 9 support staff. Although the main focus of Kennedys' work is patent and trademark advice and applications, they offer advice across the field of IP law, as well as on the strategic use of IP within organisations. As the firm has grown in size, the need to manage its information flows and relationships internally and externally has increased substantially.

The structure of the paper is as follows. The next section examines the work of patents agents such as Kennedys Patent in more detail, describing the overall supply chain, the patent process (focusing on registering patents and related processes, as an example of the processes which are central to much of Kennedys' work), the relationships with key players and the key information flows. Section 3 discusses the single case study research design. This will be followed by an evaluation of current issues across Kennedys Patent and the potential role of IS, EBusiness and E-Government for addressing some of these issues. Consideration will be given to opportunities enabled but also the challenges. The paper will close with a discussion of the conclusions and implications of the work and areas for future research will be identified.

2 PATENT PROCESS, INFORMATION FLOWS AND RELATIONSHIPS

As noted in Section 1 above, supply chains are networks of organisations and the related business processes. The management of information flows constitutes an “important aspect of managing the supply chain” (Combe, 2006, p196). This section describes a simplified version of the process of registering a patent, highlighting the principal relationships in and information flows in the supply chain. The discussion is based on Gordon et al (2006) where a more extended treatment, with greater emphasis on the legal aspects, is given.

A patent is :

“an intellectual property right, granted by a country’s government as a territorial right for a limited period. Patent rights make it illegal for anyone except the owner or someone with the owner’s permission to make, use, import or sell the invention in the country where the patent was granted. As long as renewal fees are paid every year, a UK patent has a life of 20 years and provides protection throughout the UK, but no further” (UK Intellectual Property Office, 2007, p6.)

This definition introduces several concepts which are explored further below. Firstly, *invention* – what can be protected by a patent. Secondly, a patent is *granted* by a government and has to be applied for. Related to this is the concept of *territorial rights* – there is no single patent that covers the whole world so multiple patents covering a number of different jurisdictions may be required. Finally, *renewal* – the registration must be kept ‘current’ or it will lapse; allowing others to use the invention.

Supply Chain/Principal Relationships

The Oxford English Dictionary defines a relationship as “the way in which two or more people or things are connected” or “the way in which two or more people or groups behave towards each other”. Supply chains incorporate relationships between people involved in supply chain processes and activities across the same organisation and between different organisations. Relationships between organisations can range from arm’s length relationships (consisting of one-off exchanges between two organisations) to vertical integration of the two organisations. In the United Kingdom (UK), the supply chain of patent agents comprises of three principal relationships: Client ↔ Patent Agents; Patent Agents ↔ Patent Offices (UK or European); *Patent Agents ↔ Overseas Patent and Trademark Agents*¹. These are discussed in greater detail below.

Client « Patent Agents

Dawson emphasises the importance of client relationships as being “central to the ability of professional service firms to differentiate themselves from their competitors” (Dawson, 2000, p 19). A (prospective) client may approach a firm of patent agents seeking advice on what they hope is a patentable invention. To be eligible for patent protection the invention must be novel, involve an inventive step, be capable of industrial application and not be ‘excluded’ (eg a mathematical method) (Gowers, 2006, pp13-14). The patent agents may advise on the legal and commercial alternatives available. If appropriate, the patent agents may then act on behalf of the client in registering the patent. As noted above, patents are territorial in scope and a key decision may be in which jurisdictions to register. In the case of UK based patent agents, the firm would normally interact directly with the relevant UK² or European patent office.

¹ For brevity, the term ‘foreign associates’ will be used in this paper as a synonym for ‘Overseas Patent and Trademark Agents’.

² The UK Patent Office (UKPO) became the *UK Intellectual Property Office* (UKIPO) on 2 April 2007. Where more than one patent office may be relevant (eg UK, European or US) then the term ‘patent office(s)’ is used. To simplify the terminology, the acronym UKIPO is used when referring specifically to the UK office whether or not it is, strictly speaking, the UKPO (pre-April 2007) or UKIPO (April 2007 onwards) that is relevant. References have been left as referring to the UKPO or UKIPO depending on the date of publication of the source material.

Patent Agents « Patent Offices

Taking registering a patent in the UK as an example (see Gordon et al, 2006 for greater detail), the process is as follows (see Table 1):

Table 1: Simplified process of registering a patent in the United Kingdom

Stage	Activity	Comment
1	Filing an Application for Registration with the UK Intellectual Property Office (UKIPO).	Starts the process and gives the extremely important 'filing date'.
2	Preliminary Examination, Search and Search Report	The application will be examined to ensure it meets all formal requirements. A search of the UKIPO's database for published material upon which to assess whether the invention is 'new' and 'inventive'.
3	Initial, or 'A' Publication	The application and search report are published and made available for public inspection. The purpose of this is to allow third parties to comment on whether the patent should be granted.
4	Substantive Examination	Examines the validity of the invention in relation to the requirements of novelty <u>and</u> inventive step <u>and</u> industrial application. This may require a dialogue between the examiner and the applicant (client; via the patent agents) concerning, for example, objections raised regarding the granting of the patent and the applicant's responses. This iterative process, if required, will continue until agreement is reached.
5	Grant of Patent	If the application is not rejected following substantive examination, the patent will be Granted.
6	'B' Publication of Granted Patent	The details of the patent are 'published' and are in the public domain.

Source: Adapted from Gordon et al, 2006, Section 4.2

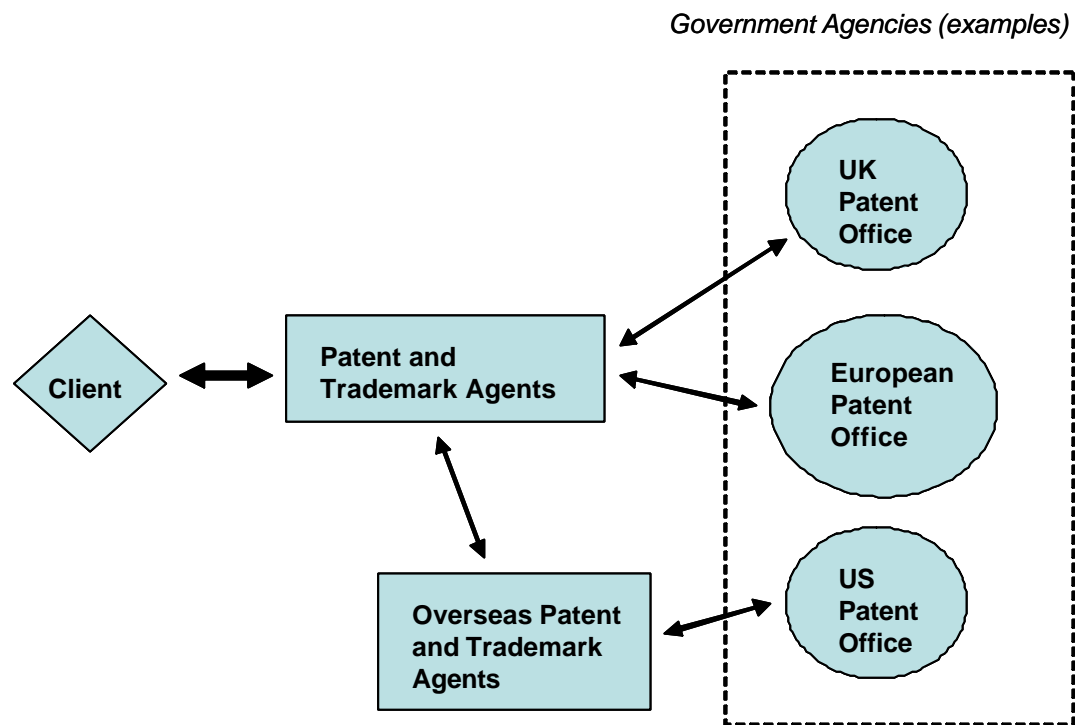
Once granted, the protection offered by the patent is initially for four years, with renewal (and related fees) required every subsequent year up to a maximum of twenty years.

Patent Agents « Overseas Patent and Trademark Agents

As noted above, patents are territorial in nature. So for non UK and European jurisdictions (such as the United States) a UK based firm of patent agents may liaise with a firm of patent agents ('foreign associate') in that country. This requires the timely and appropriate transfer of information between the UK based agent and the foreign associate.

The relationships between client(s), government agency(ies) and overseas associate(s) can be considered to form the patent agents' supply chain (see Figure 1). Where appropriate, such as to secure the enforcement of IP rights, relationships with lawyers may also be involved. However for the purposes of this paper, the lawyer-patent agents' relationship is not seen as being a 'principal relationship'. Communication and the exchange of appropriate, accurate and timely information are crucial to the process – in particular to ensure strict adherence to deadlines.

Figure 1: Patent and Trademark Agents: principal relationships



Information Flows

Based on the discussion above, the process of registering a patent can be seen to be complex, time consuming (“usually [taking] between three and four years”; UK Intellectual Property Office (UKIPO), 2007, p9) and, perhaps in consequence, expensive. Fees for the UKIPO and the professional services of the patent agents may run to several thousand pounds for a UK patent, or tens of thousands where an international application is made in several countries (UK Intellectual Property Office, 2007, p9).

The information flows relating to the work of patent agents can be regarded as being externally and internally driven. The flows within these two broad categories are two-way rather than unidirectional and there is, of course, interplay between the two broad categories themselves. Some examples of these information flows and the nature of the information required are given below.

External Flows

Between the client and the patent agents:

- Information from the client regarding the nature of the invention to enable the patent agents to the draft the application.
- Information/communication with the client regarding any subsequent clarification required, for example relating to the substantive examination if objections are made.
- Ongoing communication with the client regarding the progress of the application, and the amount (and payment) of any fees due such as outgoings (eg fees due to the relevant patent office(s)) and/or payment to the patent agents for the work undertaken on the client’s behalf.

Between the patent agents and the patent office(s):

- Filing an application and subsequent monitoring of its progress. Awareness of the law and process required including the form and content of the documentation as well as the timescales involved.
- The patent agents will act as ‘conduit’ for communication between the patent office(s) and the agents’ client.
- Where the patent agents are also managing the renewals process – knowledge of that process and in particular the date renewal is due.

Between the patent agents and foreign associate(s):

- Information concerning the location and availability of foreign associates, their specialisms, and in which jurisdictions they operate.
- Communication and information exchange between the patent agents and the foreign associate(s) to *inter alia*, ensure the associate(s) are managing the client's work in an appropriate and timely manner.
- Information regarding the fees charged by the foreign associate, as well as the current and predicted amount to be billed.

Between the patent agents and the legal system(s):

- Patent attorneys require access to the relevant statute and case law relating to jurisdictions within which they are registering the patent; as well as practice guidelines issued by the patent office(s).

Internal Flows

- There is a need for efficient and effective case management to provide *firstly*, a clear indication of what task has to be done, and *secondly* internal monitoring of the progress of the application, renewals and communication with the client, patent office(s) and foreign associates - including a clear intimation when tasks have been completed.
- An awareness of the time spent by a fee-earner on a particular matter for a particular client is crucial to the management decision-making of professional services firms (Mayson, 1997). From an external-facing perspective, these 'billable hours' form the basis for calculating the fee charged to the client. From an internal perspective the firm's management will attempt to maximise the time fee-earners spend on 'billable' rather than 'non-billable' hours – a precursor of this is knowing who has done what, and when.
- Related to time recording, as a for-profit business the patent agents must manage the information flows relating to invoicing clients for fees owed, and dealing with the payment/non-payment as required.

In summary, the whole process is data and 'date driven' with the filing date being of crucial importance in establishing the 'priority date' (and time) for the client's invention. The priority date being, effectively, the date upon which you would obtain protection from any patent – and any very similar 'invention' from after this date may have to yield to your priority/prior invention. A range of information in various forms (eg paper, electronic or speech-based) is required in order for patent agents to discharge their work effectively in such a date-driven environment. Effective workflow/case management is vital.

This section outlined, in general terms, the work of patent agents (focusing on patents in particular), as well as the principal relationships and information flows involved. The next section discusses the case study strategy adopted to analyse the potential impact of IS on these aspects of the patent supply chain.

3 CASE STUDY STRATEGY: KENNEDYS PATENT

A single case study based on Kennedys Patent has been conducted for the purposes of this research. Benbasat, Goldstein and Mead (1987, p 370) argue that case studies can examine:

“a phenomenon in its natural setting, employing multiple methods of data collection to gather information from one or a few entities (people, groups, or organizations). The boundaries of the phenomenon are not clearly evident at the outset of the research and no experimental control or manipulation is used.”

Case studies consist of detailed investigations and allow research to be conducted in natural settings. The phenomenon is not isolated from its context (as in, say, laboratory research) and is of interest precisely because of its relation to its context (Hartley, 1994). This research explored the potential use of IS for enhancing information flows and relationships within the intellectual property sector and in particular a patents and trademark agent. A case study was necessary for exploring why,

how and what information systems could potentially be used. The research needed to essentially be contextualised, evolving and gather the subjective opinions of key actors in the patent supply chain.

Case study strategies can involve single or multiple cases. Yin (2003) states that single case studies are appropriate if: it represents a critical case in testing a well-formulated theory; it is an extreme or unique case; it is a representative or typical case; it is a revelatory case; it is being used as a longitudinal case. There are of course other situations that single case studies may be used. For example, a researcher may use it for exploratory purposes, before they conduct a multiple case study (Benbasat, Goldstein & Mead, 1987). In this particular research a single case study was being used which was longitudinal for the purposes of exploratory research and as a stepping stone for further research.

Case studies are also appropriate for studying areas of research that few studies have been carried out. The nature of IS, is such that many areas are new and emerging and consequently research and theory are at there early, formative stages (Benbasat, Goldstein & Mead, 1987; Eisenhardt, 1989). In particular, research on IS in the supply of services and specifically legal/patent services, is still in its infancy and case studies are therefore useful for exploring this emerging area of research. A range of data collection methods were used including participant observation, interviewing, questionnaires, document analysis and process mapping.

4 CURRENT ISSUES

Firstly, the research explored issues and problems that needed to be addressed in Kennedys Patents' current supply chain, key processes, information flows and relationships. These are summarised under the following categories: Case Management; Integration; Security. The state of the current IS within Kennedys has contributed to many of these issues. Currently, there is a client and case management system, an invoicing/billing system, a range of bespoke databases e.g. new enquiries, renewals, foreign associates, a range of documents and a poorly configured virtual private network (VPN) with limited access from remote offices. The different IS are not well integrated and consequently there is little coordination between (and with) the internal and external information flows. This raises a number of key shortcomings that are outlined below. It should be noted that many of these issues are not unique to Kennedys and are likely to be common across many professional services firms.

Case Management: The first category of issues is related to the management of different cases. Kennedys does not have a common file naming convention and central repository for all electronic client and case documents. Problems are apparent when a new member of staff is introduced or a current member of staff is absent. Each secretary has implemented their own naming and saving process thus finding a particular document becomes a time consuming and tedious task. The invoicing process for cases handled for clients is also flawed. Certain aspects of the process are a major cause for concern including the manual generation of invoice numbers. For example, when generating a new invoice, the secretary needs to take the next available invoice number from the table and mark the client/case details next to it. This 'manual' (rather than automated) system proved efficient enough when the firm operated from one central office but is not easily supported by Kennedys' current multiple office structure. Moreover, the current system is proving inadequate for ensuring the correct account of time spent on each case is accurately recorded. Invoicing a client for the correct amount of money is obviously of great interest to both parties involved, as clients do not wish to be overcharged, just as firms would rather not sell themselves short. In line with many other firms in the legal services sector (Mayson, 1997), recording the time spent on a client's work provides the 'billable hours' that form the foundation for calculating the amount to be invoiced to the client.

Integration: Many of the above problems are exacerbated by the fact that Kennedys have outgrown their current IS as their business has seen significant growth in recent years, expanding from one office to three offices across the UK. Kennedys currently use a number of different systems and the limited integration has led to many dispersed documents (named inconsistently) across systems with no solid links between them e.g. certain documents in the document management systems should be linked to cases within the case management system. This currently means switching from one system to another to try and establish linkages between documents which is a very time consuming and error prone process.

The lack of integrated systems and processes leads to unnecessary human intervention (with consequent cost increases in terms of time and the risk of errors). Lack of integration also limits the

reporting options offered by the systems or at the least requires the difficult task of data reconciliation/mining across systems to generate relevant reports. The manual generation of invoice numbers is also symptomatic of the wider integration issue. For example, there is currently limited visibility of 'bad payers' (clients who are slow to pay or who do not pay). The only way of recognising/identifying bad payers is to manually check the accounts package. As few users have access to the accounts system or the time to investigate the issue, there is an increased chance of work being conducted which the firm may never get paid for.

The potential integration of case, time, invoicing and document management systems would provide a number of potential solutions to current problems. For example it would alleviate the time spent through human intervention and also streamlines the whole process and ensure each client is charged the correct amount. It would also offer opportunities not only for the firm but additionally for the client (Hinde, 2006). Providing clients with access to integrated personal portfolios would cut down on client/attorney interaction time e.g. a client would no longer need to be charged for the breakdown/status report of a particular case.

Security: The final category of issues is mainly related to security. This is a vastly important issue due to the sensitivity of the data with which patent agents such as Kennedys have to process. Ensuring client data is kept as secure and private is one of the most important aspects of any patent agents' IS. Kennedys have recently changed the way they conduct certain matters across their offices. They introduced a Citrix enabled network has meant that there is now no need to transfer a copy of the client and case database to each of their other remote offices. The security, authentication and permissions have also been enhanced during this change of network architecture, leading to a more stable and efficient VPN.

However there is a tension between the requirements for security, and being able to provide the appropriate access to staff (in office(s) or teleworking) or clients(for example), as required by the current business context facing the firm (Bunke, 2005; Hinde, 2006). Currently, clients have no access to the Kennedys system and must contact staff directly to be furnished with their desired IP report/portfolio. The way forward is to build upon the current architecture and introduce some kind of integrated practice management system that would allow client access. Due to Kennedys' view on information security, extra layers of security and authentication will be required to ensure those, and only those, permitted will be capable of accessing the new system. One possibility is to introduce a requirement for biometric authentication before access is granted.

Overall, the current systems are contributing to many of the issues or problems that are evident with Kennedys Patent. They are also providing limited business value and most certainly are only being used for operational purposes. The firm and its clients could potentially benefit from more careful application and greater exploitation of IS for maximising strategic opportunities.

5 THE POTENTIAL ROLE OF INFORMATION SYSTEMS, E-BUSINESS AND E-GOVERNMENT

From one perspective, IS can play a role in making information available, enabling communication and informing decision making. Many of Kennedys processes and information needs can be supported through the use case management tools such as electronic diaries, document assembly techniques, databases and automatic accounting and billing of clients to automate as much of the process as possible (saving fee-earner time and reducing costs), while ensuring quality standards are met (Leith and Hoey, 1998; Susskind, 2000).

More innovative application of specific types of IS may even lead to aligning organisational activities, creating value, exploiting benefits and maximising strategic opportunities. Susskind predicted that most major law firms would be using IS and information and communication technologies (ICTs) to provide clients with a wide variety of services online by 2005 (Susskind, 2000). Unfortunately, this has not been fully met by providers of legal services (and indeed patent and trademark agents) despite clear benefits to firms and clients. The principal drivers for any changes which have taken place to date have been the internal dynamics of the firm which have, in turn, been influenced by the need to acquire competitive edge, through improving the service to the client (Barton et al, 2000; Bernstein et al, 2001; Thomson et al, 2000a; Thomson et al, 2000b). Historically at least, the interface of the law office with other, external bodies, most notably government, agencies has been limited, suggesting that there was not much pressure for change beyond that internal dynamic, whether from clients or the agencies themselves. Recent developments in IS and ICT, particularly those focusing on the Internet and the www, offer patent agents potential opportunities from two perspectives

in particular. Firstly, there are general *e-business* opportunities relating to the electronic interactions between the patent agent and their clients, overseas patent agents ('foreign associates'), and lawyers. Secondly, and in particular, there are *e-government* opportunities relating to electronic interactions with government agencies such as the UKIPO.

The growth of e-business has presented significant opportunities. Amongst these is the potential for adopting online technologies within the field of supply chain management (SCM). Online technologies have been seen to impact major supply chain processes, supply chain coordination and supply chain relationships. The use of e-business for enhancing the efficiency and effectiveness of supply chains has provided many benefits. Croom (2005) suggests a collection of primary objectives of e-business implementation including supply chain integration, cost reduction, knowledge development and learning, IP and information flow control, supporting speed of change, managing global customers and suppliers, developing e-procurement practices and improving lead time management. Online technologies could potentially be used within supply chains of legal service firms (see for example Holmes, 2006; Susskind, 2000), and more specifically patent agents (see for example Hinde, 2006), for providing services and enhancing the management of supply chain and client relationships. Application areas could revolve around key business processes such as case management, time recording, invoicing and billing and online filing of patent applications and be used for communicating and sharing information with clients.

E-government has also grown significantly, with important implications for the provision of legal services (Mitrakas, 2005). This has been made possible by the convergence of technical infrastructure, the uptake of broadband to make the transmission of complex documentation in lengthy procedures possible, the development of appropriate authoring languages and software, and the provision of secure networks. One particular area which is having an impact in the field of IP is electronic online filing (eOLF). More particularly, IPR Registries like the United Kingdom Intellectual Property Office (UKIPO) and the European Patent Office (EPO) have recognised the benefits of online filing of applications (see UK Patent Office, 2006; European Patent Office, 2005) and a standard filing format has been agreed (World Intellectual Property Organization (WIPO), undated; Berwin and Ankyn, 2002). This, it is suggested, is a powerful driver for change and provides a spur for Patent and Trademark Agents to develop and/or enhance their use of online technologies, leading to competitive advantage in what Bunke (2005, p1) describes as "an increasingly competitive environment, where there is a necessity to develop ... business in new ways". It is also an environment circumscribed by a constantly evolving legal and procedural frame work within which identity, security and authentication are of paramount importance due to the commercial sensitivity of the matters being dealt with.

6 OPPORTUNITIES

Focusing on the patent agents' supply chain (Section 2) and the current problems identified in Section 3, this section of the paper highlights the main areas of patent services that can be developed through the use of IS, e-business and e-government. It will also outline the key drivers and opportunities for using them including streamlining information flows and for enhancing relationships with clients, government agencies, overseas agents and lawyers.

Patent agents specialise in IP which, given the data and date-driven nature of their product/service, has a particular potential to be strategically managed through the use of IS, e-business and e-government. There are many different classifications of IS depending on their role e.g. Transaction Processing Systems, Management Information Systems, Decision Support Systems and in particular there are specific types of IS available e.g. Enterprise Resource Planning (ERP) systems, Documents Management Systems, Electronic Data Interchange (EDI) and Practice Management Systems. In particular, IS such as integrated practice management systems will offer opportunities for automating a range of functions and services provided by patent agents. For example, it can be applied to many different processes involved in case management e.g. registration of patents and renewals. It can also be used for monitoring the amount of time that is spent on different cases, billing and invoicing, online filing, effective date and deadline monitoring as well as searching for files or previous patent applications. On top of this, e-business technologies such as intranets, extranets, EDI and so on can be used to not only transform patent agent's processes but also integrate back end and front end supply chain processes. E-business and online practice management system can enhance the efficiency and effectiveness of patent agents and offer a range of benefits including access to all case materials, improved efficiency and workflow, time and resource savings, improved reports and structures, audit and history trail and a user friendly interface. Online access also provides agents with easy access to relevant information and the opportunity to telework (working from home or at another location remote

from the firm's offices). Moreover, online access to a greater depth of information can enhance knowledge sharing and encourage dissemination of best practice.

These kinds of benefits can have an impact on the level of customer service provided to clients and the types of relationships that can be developed. In addition clients can have the benefits of easier access to information, transparency and feedback, detailed reports (for example detailing the current status of work-in-progress (WIP)) which are automatically generated by the system and an improved invoicing service (for example adjusted automatically to display different currencies as required). Portals may be developed for aggregating and customising information and facilities that are appropriate for the needs of different clients.

As patent and trademark agents spend much of their time interacting with government agencies on behalf of their clients, online technology now presents agents with the ability to increase efficiency and profitability in the management of those relationships. In particular, Epoline (the EPO and UKIPO online filing platform) (Epoline, 2006) offers an application building function that validates patent applications electronically. This effectively automates the preliminary formalities examination (part of Stage 2 in Table 1), thus minimising errors, inconsistencies or omissions. The system imposes a standard file format, ensuring there is much less paper going backwards and forwards; aspects such as 'filing dates' can be issued immediately upon applying online, therefore saving time. There is much more transparency and the chances of applications being lost or stolen during transit are nullified by the use of this service. All information passed to the patent offices is encrypted using state-of-the-art smart card technology and users have the reassurance that the application the patent office receives is identical to the copy retained on the applicant's PC. Patent agents are automatically sent a filing receipt and another, perhaps the most important, benefit of online registration is that it attracts significant fee reductions, or discounts (UK Patent Office, 2005).

Relationships with overseas agents can also be enhanced as overseas agents can be provided with more information via secure portals which include cases related to them, and may on occasion allow agents to make updates. In particular, the amount of work that has been given to overseas agents can be monitored by the patent agents, and vice versa.

Overall, IS, e-business and e-government provide a range of opportunities for improving both the internal and external information flow and the management of external relationships with clients, government agencies and other overseas agents. They offer greater transparency, access to more information and a higher level of efficiency and more importantly the opportunity for patent agents to reap competitive advantage. Finally, they also present the organisation with more chances for expanding their existing offices and moving into different locations ('scalability'). In the future there may even be the opportunity for developing online IP services offering "premium advice and know how" to corporate clients (Holmes, 2006, p2; Susskind, 2000; Terrett, 2000).

7 CHALLENGES

Although there are various opportunities offered by IS, e-business and e-government across patent agents' supply chains and in particular for improved information flow and relationship management, there are also a number of key challenges faced by firms such as Kennedys. Patent agents operate within a challenging and evolving legal and procedural framework within which identity, security and authentication are of paramount importance. Therefore, IS solutions need to incorporate technologies that will address these issues. In some respects current developments in IS offer the opportunity for patent agents and government agencies to articulate issues such as identity management, security and authentication, but on the other hand they also pose greater challenges. These challenges include issues such as establishing permissions, whether on a per-user basis or on a per-group basis, ensuring the correct level of security is in place to allow authorised persons home access to certain electronic documents or reports, and ensuring any of these changes do not compromise the functionality of the current system being used.

As highlighted above, security is of paramount importance when opening a door/portal to a back office system, for reasons such as confidentiality and privacy. This is especially important when dealing with information as sensitive as that of new inventions. Needless to say, a simple username and password may not be enough security to protect such highly sensitive information. Identity management is required to ensure sensitive/private information can only be accessed by those authorised to do so. There are a number of technologies currently available that can identify/verify authorised users of a system and can be incorporated into an online environment. These range from simple 'username and password' to digital certificates and digital signatures, to more advanced technologies such as biometric solutions. Biometric solutions offer greater security over their predecessors due to the incorporation of 'something you are' (Smart Card Alliance, 2002) as opposed

to 'something you know'. Furthermore, authentication of users is significantly enhanced as passwords can be guessed, conveyed to, or stolen by unauthorised users of a system, whereas biometrics cannot be stolen or forgotten, and are extremely difficult to forge (Smart Card Alliance, 2002).

Once the decision has been made as to which level of security is required, the next challenge faced is ensuring the correct permissions are in place. Visibility and access to certain levels of the system should be sub-divided into a per-user and per-group hierarchy. Staff members at Kennedys should be divided into groups (for example senior management, fee-earners and support staff) as they must have access to most case details anywhere and anytime. However, efforts must be taken to ensure that some fee-earners cannot access any documents where there may be a conflict of interest. This may prove to be challenging and will depend greatly on the practice management system being implemented. Permissions for client access should be based on a per-user basis, thus only allowing a view or read-only permission when accessing the system. The main challenge here is ensuring that clients that have access to the system cannot access any other documentation or reports not related to them.

For Kennedys in particular, due to the architecture of their current systems, providing streamlined interaction with online filing would be a considerable task. The possibility of encountering problems when generating the forms required for online filing is exacerbated due to the proliferation of systems, especially when working across multiple sites. These issues of integration and streamlining must be addressed by Kennedys in the near future to allow them to benefit, in turn, from the technological advances made with respect to the online filing of patent applications.

In summary, using IS and related e-business/e-government applications for enhancing information flows and relationship management is by no means a straightforward task, especially when dealing with highly sensitive material. Ensuring the correct security measures are in place will go some way to make clients feel secure when using organisational systems.

8 CONCLUSIONS AND IMPLICATIONS

This paper examined the potential role of IS, e-business, e-government for enhancing the supply chains of organisations in the IP sector. There is a growing awareness that the strategic management of intellectual capital, which includes IP, is a key aspect of business success. Exploratory research was undertaken through a single case study of Kennedys Patent (a patent agent offering IP services) who are responsible for handling information regarding patent and trademark advice and applications and acting on behalf of clients with overseas agents, government agencies and lawyers. The key conclusions are as follows:

The development and adoption of IS, e-business and e-government within this sector is driven by the interplay of both internal and external factors. From the internal perspective, the research identified a number of areas where current systems and supply chain processes could be enhanced and streamlined through automation e.g. document management, invoicing and time recording. Moreover, a significant issue was the integration of a range of existing and emerging systems and online filing to allow maximised internal efficiencies and information flows across a range of staff, departments and offices. This internal focus was seen as a precursor to benefiting from the opportunities offered by online technologies (including e-business and e-government) for developing external relationships and interactions with clients, government agencies, overseas agents and lawyers and providing facilities such as portals allowing clients access to data such as customised reports.

The multi-jurisdictional framework within which patents agents operate, rather than being a barrier to the emergence of standards may actually be a driver for change. From an e-government perspective, it is clear that government agencies such as the UKIPO and EPO are committed to online filing (see for example the UKIPO's vision for an 'Electronic Patent Office' (UK Patent Office, 2004)), and both standards (Berwin and Ankyn, 2002) and software such as Epoline (Epoline, 2006) are emerging. Software houses will increasingly model their case management solutions with electronic online filing functionality in mind. The associated benefits of online filing in terms of time, and perhaps cost, may be passed on by the firm to clients and overseas agencies. There may be the opportunity to deprofessionalise ('leverage' in Mayson's (1997) terms) some of the administrative aspects of the patent agents' work, freeing the fee earner to concentrate on high value tasks requiring more of their professional competence.

Online technologies enables the clear benefits of 24/7 access to appropriate elements of the firm's systems from anywhere in the world to staff (in terms of teleworking) and to external bodies such as clients (e.g. portals). However, given the nature of the work carried out by patent agents, firms must strike an optimal balance between providing the appropriate access to the firm's systems, and the potentially devastating consequences of the misappropriation of sensitive information due to weak security and authentication systems. One way forward may lie with biometric authentication.

The issues and challenges faced by Kennedys are not unique to the firm: they reflect and reinforce many commentators' views on the opportunities offered by IS and in particular online technologies for streamlining information flows and enhancing relationships within the broader legal services sector and beyond (for example Bunke, 2005; Croxton et al, 2001; Hinde, 2006; Susskind, 2000; Terrett, 2000).

9 FUTURE RESEARCH

The firm, around which this research is centred, is still undergoing substantial development and implementation of the IS and online technologies. The practice management systems and the e-business related systems are likely to be developed further to embrace other areas of internal and external functionality, and provide greater opportunities for competitive advantage. This area of research would benefit from conducting a more in-depth longitudinal case study research to monitor and evaluate the organisational impact of these developments. Secondly, from an e-government perspective future research should include observing further developments in the online filing systems offered by agencies such as the UKPO and EPO, and the requirements which such bodies may make on patent agents to embrace online filing.

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