Small firms and information and communication technologies (ICTs): toward a typology of ICTs usage

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Despite government support for a number of initiatives to encourage more small firms to adopt information and communication technologies (ICTs) implementation of ICTs has been a slow and very diverse development. This article examines the relationship between small firms and ICTs and highlights a number of typical, but often negated, characteristics that show how small firms use the technology.

This article considers the relationship between small firms and information and communication technologies (ICTs) from the perspective of the small firm. It is frequently alleged that ICTs are having a dramatic effect on society. In the context of work and economic life ICTs are allegedly changing organisational structures, methods of production, means of communication and working patterns (cf. Toffler, 1981; Webster, 1995; Castells, 1996), while the recent ‘dot com’ wave has compounded the hype that often surrounds technology. Only lately has interest in the relationship between small firms and ICT begun to be explored in any detail (European Commission, 1995; Iacovou, Benbasat and Dexter, 1995; Lauder and Westall, 1997). There are a variety of reasons for this. Politicians and policy-makers pressing for economic competitiveness have linked the diffusion and take-up of a wide range of new technologies with competitive gains for small firms. Although ICTs are but one aspect of this they are pursued vigorously through the UK Government Information Society Initiative and through many types of European funding (Fuller and Southern, 1999). At the same time, technology suppliers view small firm use of ICT as an emerging market opportunity. In the academic community a number of commentators have devoted time and effort to consider the potential ICTs have for small firms should they adopt the new technology (cf. Baines, 1999; Stanworth, 1998).

In spite of a rise in interest in small firms and ICTs there are a number of difficulties...
with this area. First of all, there appears to be a lack of analytical clarity on how the small firm and ICTs should be viewed. This has led to a limited conceptual understanding of the relationship between small firms and information and communication technologies despite there clearly being a technology push to entice small firms to use ICT. Secondly, there is little known about how small firms are responding to the opportunities provided by ICTs, if in fact small firms see the technology as an opportunity. Thirdly, there is even less known about why and how small firms use ICTs. Often, it is blindly assumed that small firm use of ICT is beneficial and indeed, this idea of ICT being a good thing is something which is not limited to the small firm domain (Southern, 1997; 2000).

The structure of this article

In this article there is an attempt to address two of these points. To take the last point first, it is argued here that we cannot assume ICT is beneficial to all small firms. This has a huge policy implication, and is of strategic relevance to technology suppliers. Both government and private business are developing the ICT domain as a generalised entity with some tinkering at the edges in terms of customised ICT's application. Basically, ICTs are being developed as a universal response to many different types of small firm need and generic economic problems. The second issue to be approached in this article concerns knowing about how and why small firms use ICT. It is simple in that we have sought to make it lucid. This typology is grounded in the narratives extracted from a number of qualitative small firms’ interviews and we argue the strength of this approach is that the typology of ICT use maps the real experience and practices of small firms, something which is often lacking in the work on small firms and new technology (see for instance Dierckx and Stroeken, 1999). While it is not our intention here to debate in any great depth the theoretical side to small firms and ICTs, we are of the opinion that a review of these two issues will support a better conceptual understanding of the small firm in the ‘information society’.

The article is divided into four sections. Section one draws on previous work and raises a number of questions concerning the relationship between the small firm and ICTs. In the second part, the research methods employed in this study are outlined. The qualitative approach adopted helps us to map the experience and authentic practice of small firms and we explain in this section why such an approach was adopted. Some of the findings from the research are introduced in the third section. For example, the characteristics set out in the typology provide an initial understanding of why small firms are adopting ICT, and it shows some of the more objective and subjective features that can be found in small firm ICT use. Finally, in the last section the typology is used to discuss the potential opportunities, benefits and pitfalls of the technology for small firms.

The relationship between small firms and ICTs

The relationship between ICTs and small firms is a complex one. For instance, we might ask how, in moves towards an information age, would the small firm be expected to operate? One way of approaching this is to first consider the effects of what is often termed the 'information society' and then to focus on more specific issues which are drawn from the limited, but growing, research literature on ICT use in small firms.

Different views on information technologies, business and society

The idea that contemporary society is experiencing a shift from an industrial to a post-industrial age has been debated for sometime (Piore and Sabel, 1984). Some
have argued how the transformation process is leading to the emergence of a new world that differentiates from what went before and how this era is based on a fundamental dependence on the efficient processing of information and new knowledge generation (Castells, 1996). Others, such as Webster (1995), while being less convinced, have observed that information has come to be perceived as the defining feature of our times. The recent dot com excitement has at least raised awareness among the general public about how society is moving toward something qualitatively different.

The nature and scale of the changes being anticipated are often quite immense. In business it is suggested that there will be effects on organisational structures, methods of production, means of communication, working patterns and ways of learning. For instance, a few years ago the DTI put forward the following view.

The benefits of the Information Society could be considerable for smaller companies. The introduction of low cost new technologies such as the Internet and the falling cost of information services could erode the traditional barriers that have prevented smaller companies from becoming sophisticated users of information ... it is open to SMEs to play a pioneering role in adopting the tools of the Information Society. As SMEs are so pivotal to the UK economy, it may be that the route to achieving the Information Society will be through winning the hearts and minds of SME management. (DTI, 1997, p. 27)

This has remained a constant theme under a Labour administration. More recently Alan Greenspan, Chair of the USA Federal Reserve Board, argued how information processing and knowledge generation are key characteristics of the buoyancy of the US economy.

Speaking before the Economic Club of New York he stated ‘it is information technology that defines this special period’.1 

Webster (1995) has argued how no one perspective or methodology is available or universally applicable to explain the changes being experienced in society around the notion of informationalism. Furthermore, because society has always involved itself in processing information there is a need to appreciate the genealogy of informationalism and how it is entangled in perceptions of discontinuity (Robins and Webster, 1999). This is equally applicable in business, and it is unclear with respect to small firms and ICT, how many traditional methods of conceptualising small business help our understanding of this relationship.

Indeed, in the context of information systems Saarinen (1989) suggests that previous attempts to model the evolution of information systems in organisations (IS) have not taken full advantage of the possibilities offered by theories in more mature fields of scientific enquiry. Saarinen concludes that the development of IS differs from organisation to organisation, thus indicating that, ‘one general theory of growth is not sufficient, and new models permitting evaluation of the pros and cons of different management approaches to IS evolution are needed’ (p.397). A review of the literature in this area, produced by researchers and practitioners, shows a profusion of terminology that has resulted in confusion on the meaning and definition of technological vocabulary.

ICTs can be referred to not only in terms of the information society and information systems, but also through information management (IM), information technology (IT), informatics, telematics, the rhetorical notion of an information superhighway and of late (for a few) the expedient creation of wealth via dot com businesses. Reflecting one particular perspective, Boaden and Lockett (1991) found when analysing the language in general management literature how ‘information systems’ was the term in most widespread use. What this may indicate is the influence of a technological perspective over any other field of inquiry. Certainly in the small business domain research into ICTs is relatively new, but even at this stage we would make

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the point that this is an area that is socially constructed and small firm researchers need urgently to take this on board (MacKenzie and Wajcman, 1999). For the purpose of this article we use a working definition of ICTs that refers to the convergence of computers, computer networks, and electronic communications such as ISDN lines and satellite communications in the context of the social relations that surround their application.

Small firms and ICTs

Since the first microprocessor computers were introduced in the early 1980s researchers have been investigating possible ‘impacts’ of the technology on small firms. While it is fair to say that the literature on IT applications in organisations followed mainly a systems approach, often it has been assumed that small firms are part of such an examination simply by virtue of them being businesses. For example, pioneering work on systems design and information systems management, to all intents and purposes, negated the small firm (cf. Angell and Smithson, 1991; Avison and Wood-Harper, 1990; de Marco, 1978). However, what we can see is that in charting the recent interest in small firms and IT, it is possible to identify at least three alternative research perspectives.

The first of these looks mainly at technological issues. This type of work has arguably dominated the field of inquiry, and in the field of small firms has investigated the firm from an information systems or information technology perspective (cf. Naylor and Williams, 1994; Cragg and King, 1993; Raymond and Pare, 1992). Studies like these have sought to examine how IT is being used in small firms by concentrating on those important factors that influence the success of IT in small firms. What ‘success’ actually is, or how it is determined is often defined by the idea of a successful information system and not for instance, a successful business. A second standpoint is related to the first but with a greater emphasis on management or organisational perspectives (cf. Doherty and King, 1998; Swartz and Boaden, 1997; Thong and Yap, 1995). The emphasis in studies from this view is to understand the small firms’ strategic approach to using IT and the capabilities and structures of the small firm to use the technology. Finally and much more recent, there is a third approach that attempts to investigate small firms and ICT from a small firms perspective (cf. Blackburn and McClure, 1998; Fuller, 1996; Fuller and Southern, 1999). This approach lies with developing an understanding of the domain from the perspective of the small firm owner manager, or equivalent. Overall, it is less well recognised in the literature on ICT.

Dierckx and Stroeken (1999) put forward such a perspective when they introduced an actor-oriented approach to understanding IT and innovation in small firms. They suggest this helps gauge the potential ‘social spheres of influence’ as actors relay their view of what the technology might effect (ibid. p. 156). Yet Dierckx and Stroeken fail to fully exploit the potential of such an approach and their ideas are reminiscent of the human-computer interaction debate launched in the early 1980s (cf. Mumford, 1983; 1991). A more rigorous conceptual base for understanding innovation is provided by Rizzoni (1991) in her taxonomy of technological innovation in the small firm. Rizzoni shows how the owner-manager is a ‘crucial factor in determining the different innovative attitudes of small firms’ albeit based on the development of particular competence’s (1991, p. 40). While this takes us away from ICTs it reinforces the view that technology in the small firm only has meaning (and therefore can only be measured) in the context of business activity.

Too many surveys and studies on small firms and technology fail to take this on board. Lauder and Westall (1997) cite a whole range of areas for potential impact of ICT. These include cheaper and faster communications, better customer and supplier relations, better marketing, product and service development, a reduction of regul-

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2 Indeed, in the early 1990s Scott-Morton (1991) made this point when pointing to the lack of available data that show how firms are better off through IT adoption.
lation costs, and better access to information and training. Both Baines (1999) and Stanworth (1998) recognise how we cannot blandly assume positive effects from the technology but these authors, too, are part of the tendency to measure ‘impacts’ of ICTs in the small firm. Baines herself noting ‘[a]doption of the internet was positively associated with optimism about future sales and profits’ (1999, p. 28), while Stanworth argues effects of ICTs will be polarised and then rehearses the utopia-dystopia debate that have emerged with the rise of informationalism.

These points raise important issues concerning the conceptual framework used to investigate and understand the small firm and technology. The application of systems analysis methodologies and management conceptual frameworks are often the norm in such literature. Commentators working in these fields have been strongly influenced by quantitative approaches to modelling activity in an organisation and from earlier studies those models and concepts, developed almost exclusively for larger firms, have repeatedly been adapted for analysing small firms. This compounds an often-implicit assumption that says an ever-increasing use of IT is beneficial to all businesses, and how, in some inevitable way, all small and micro organisations will profit. It is a view suggested irrespective of the needs or problems that business in a sector as diverse as the small firm domain experience.

Is it any wonder then, that Chen and Williams (1993, p. 96) have observed how the ‘consideration of small firm characteristics is important in order to avoid the danger of technical determinism’. Small firms are uniquely different from larger organisations, and as a result, there needs to be many methodological ways of looking at them that can take account of this vast difference. Talk of ‘impacts’ on the small firm due to ICT inevitably falls into a technologically deterministic approach that marginalises the perspectives of the main actors involved—that is, those of the small firm manager, their equivalent and small firm employees.

Using the technology: previous work and the research questions they provoke

Obviously, it is important not to reject much of the previous literature that considers a wide range of small firm issues and problems with respect to using IT. This literature has helped, in part, to provide a focus for this work. The key issues on which small firm owner managers (or their equivalent) were questioned about for this study can be set out as follows:

- the rationale or business case for use, and particularly, why small firms use ICTs,
- the level of ICTs use in the small firm,
- how sophisticated ICT use can be in the small firm,
- what might be called the determinants of use, notably, what the motivating and inhibiting factors to use are, and
- what can be said about achieving ‘success’ or ‘failure’ in small firm ICT use.

In Saarrinen’s (1989) review of literature on the evolution of information systems it was suggested that the primary interest of the models developed to date had been the extent to which computers are used and measured in terms of the costs of computing. There are limitations to this approach as Saarrinen implies: ‘there is no evidence that the extent of use has any effect on the level of benefits gained … the cost [of computing] do not have a direct causal relationship with the benefits’ (ibid. p. 396). The descriptive qualities associated with IS models are often restrictive and while they may be able to measure growth in terms of units or costs, how they help explain the appropriateness or effectiveness of IT in organisations is still an area in need of attention.

A further attempt to develop a more thorough explanation of IT in small firms has been given by Raymond and Pare (1992) who investigated levels of IT sophistication in small manufacturing firms. They argued that IT development was based on the nature, complexity and interdependence of use and management in the business (ibid. p. 7), and they adopted Nolan’s growth stage model as a framework for
Each small firm was given a profile based on a four dimensional construct of sophistication—this being technology, information, function and management. In their results Raymond and Pare (1992) argued how small manufacturing firms exhibit a relatively low level of sophistication in regard to their management of IT.

However, more interesting are the comments on the use of Nolan’s model as an instrument for measuring IT sophistication. On this subject Raymond and Pare believe that those concerned with information systems in businesses ‘have made very few attempts to develop an alternative framework, and thus establish solid theory on which to found the measurement of IT sophistication’ (ibid. p. 13). Clearly, the relationship between ICTs and small firms is a dynamic process of development. This does not, however, necessarily mean that ICT development in the small firm is sequential or linear, as the Nolan six-stage growth model tends to indicate.

Recent work by Blackburn and McClure (1998) sought to investigate the use of ICT in small business service firms. Their study found an uneven rate of IT innovation, and a varying use of ICT among these firms. Further to this, they claimed that owner-managers appeared to be a key underlying influence of use. They suggested owner-managers attitude, knowledge, experience and readiness to train others in their organisations, in addition to the overall managerial approach to the business, is often more influential than business size and sector in understanding the use of ICT. Blackburn and McClure (1998) thus categorised owner-manager characteristics based on three dimensions: attitudes toward ICT; level of ICT skills; and management orientation (which they explained as being either IT focused or operation/administration focused). From their analysis Blackburn and McClure identified three types of owner-manager. The first they called the enthusiast, the second the pragmatist and thirdly, the artisan (see Table 1).

The typology developed by Blackburn and McClure (1998) is useful as it highlights the importance of the qualitative characteristics of owner managers in understanding the relationship between small firms and ICTs. They demonstrate that while contributions from the researchers in the fields of organisational management or information technology may be useful, often such work does not present a complete picture of the owner manager ICT experience. In fact, many of the quantitative research methods used in small firm inquiries, or in IT research, often fail to recognise some of the most basic of points made in the typology put forward by Blackburn and McClure (1998). The categorisation of small firm ICTs use explained in this article is similar to that of Blackburn and McClure in that it suggests technology in the small firm is socially shaped. However, there is a subtle difference. On the basis of this being an indicative and exploratory categorisation, and in an effort to lay a basis for much deeper analytical clarity on this matter, the investigation here rests on the small firm as a whole unit and is not focused only on the individual characteristics of the owner-managers or key employees. The shaping of ICTs in the small firm is not one led by an intrinsic set of values held only by a single individual but is carried

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<tr>
<th>Enthusiasts</th>
<th>Pragmatists</th>
<th>Artisans</th>
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<tr>
<td>High IT skills</td>
<td>Low IT skills</td>
<td>Low IT skills</td>
</tr>
<tr>
<td>Positive attitude</td>
<td>Pragmatic attitude</td>
<td>Unconvinced attitude</td>
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<tr>
<td>IT Mgmt. focus</td>
<td>IT Mgmt. focus</td>
<td>IT operations/administration focus</td>
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Nolan’s model was developed for use in larger firms and suggested there are six stages to computer growth: initiation, contagion, control, integration, data administration and maturity. Maturity in this context refers to a state where information resources are fully developed. An organisations ultimate aim is information systems maturity, thereby relating organisational growth to evolution (Raymond and Pare, 1992).

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out within the social parameters in and around the organisation and therefore is influenced by many actors.

The methods used in this work

One of the major challenges to studying small firms is the issue of defining what the object under study actually is. In this study a small firm was defined in general terms as a business with less than 150 employees and that was not a subsidiary of a public limited company. Access to small firms is also an obvious issue for researchers and we selected our population from a number of sources. We had access to a limited corporate technology supplier dataset (this included names and addresses of business customers), we used the Yellow Pages business dataset, personal contacts and a local authority business directory. Firms were selected by location, size and sector and letters were sent out requesting an interview, while follow-up telephone calls by the researcher negotiated access to each business. Firms were contacted from a range of industrial sectors that we have simply classified as manufacturing or services, and from five geographical locations in England including the North East, Yorkshire, the North West, the West Midlands and the South East. The size of the firms (determined by numbers employed and not turnover) ranged from self-employed (0 employees) to 135 employees (see Table 2). Our sample of 33 small firms included eight micro-firms employing between 0 and 9 people, twenty meso-size firms employing between 10 and 50 people and five who employed more than 50.

There is a point of caution to be made at this point concerning method. While it is always difficult to distinguish between types of research technique the study has not attempted to suggest difference of small firm ICT use between industrial sector or by location. Nor have we sought to capture what might be termed a ‘representative’ sample of small businesses that would be necessary were we to carry out statistical extrapolation from the results of the research. The sampling was opportunistic and deliberately concerned with avoiding claims to universal characterisation that appears to simplify much work on small firms. Our aim has been to provide an indication of ICT use from the perspective of the small firm based on a typical scope of use: high use, medium use and low use. In each firm a semi-structured interview was carried out with the owner-manager or an equivalent with responsibility for IT between February and June 1998. It is pertinent to note how the preparatory work for qualitative interviewing, including initial contact with the firm and constructing a loose structured questionnaire, along with the time required for different stages of analysis of interview data is part of the effort required to ensure authenticity rather than generalisability.

In each interview, the interviewee was prompted to elaborate on various issues to provide his or her own perspective of ICTs. A number of key issues were pursued and the interview schedule covered the following topics:

- the historical background and general characteristics of the business;
- what information and communication technology was in place;
- where responsibility lies for managing the technology and the method, if any, for ICTs business planning;

Table 2: Distribution of interviews by size and sector

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<tr>
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<th>Micro (0–9)</th>
<th>Meso (10–50)</th>
<th>Medium (50+)</th>
<th>Total</th>
</tr>
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<tbody>
<tr>
<td>Manufacturing</td>
<td>3</td>
<td>12</td>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>Services</td>
<td>4</td>
<td>7</td>
<td>0</td>
<td>11</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>8</td>
<td>20</td>
<td>5</td>
<td>33</td>
</tr>
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the ICT adoption process, for instance whether it was a planned or piece-meal development;
- if any incentives existed which encouraged ICTs purchase and adoption;
- what after sales service and support was like;
- the barriers to and benefits from the technology;
- future opportunities from ICTs;
- the affects the technology had on changing the business;
- whether ICT is an inducement to new business practices;
- and how the firm dealt with any new needs, for instance relating to training and new skills.

We believed these points would enable the small firm perspective of ICTs to emerge. It would help us to avoid a technologically determined approach and rather than working from any a priori model the aim has been to ground in empirical reality, a set of ideal types gathered from the interviews. The semi-structured interviews provided information on what sort of technology exists in the small firm, how key personnel believe the technology is useful, and why it has been adopted. The ideal types of small firms using ICTs presented here form a useful concept because they act as an initial starting point to simplify and identify key aspects of what are complex social and technological relations. The rationale for ideal types is drawn from Weber’s attempt to generalise beyond a specific set of circumstances, without attempting to suggest a series of universal laws applicable, in this instance, to the small firm sector (see Smith, 1998 for further explanation). Thus, the typology outlined below offers no final answers to the questions emerging about small firms and ICTs, but each type is useful for future use in further, more intensive investigation.

How small firms use ICTs: indicating some ideal types

The results of the work have produced an indication of three types of small firm use of ICTs. For the sake of simplicity, we have called these low users, medium users and high users but even with such uncomplicated reasoning, there are still two distinguishing features of this typology. The first is that the typology is a map of ICT use. One of the main points from this is that such a mapping is not a linear model of growth, nor is it a linear model of firm development such as those noted above (Saarinen, 1989; Raymond and Pare, 1992). This means it should be interpreted as a non-hierarchical typology of ICT usage. Second, is the relative and dynamic nature of the relationship between each type of use. The typology is arbitrarily set at appropriate distinguishing points. That is to say that there is a strong temporal dimension to this typology, and that use is relative to a specific moment in time. For example, a small firm that is defined as a high user today maybe a low user in 18 months time. Technology is constantly changing as are other business and non-business factors. Together these combine to influence the reason for using ICT and the way the technology is adopted and implemented.

We would suggest that the relationship between types of ICT use is non-linear, is dynamic and is relative. Small firms who use ICT are subject to the fuzzy boundaries that exist between types of use precisely because the characteristics influencing use are unique to each small firm and constantly in a state of flux (see Figure 1). Therefore, the category (in the typology) in which any particular small firm is placed, is but a snap shot at any given point in time. Assessed 12 months later on and although many aspects of the business would have changed the small firm could still maintain the same position in the typology, or alternatively, may have reduced or increased its level of use. With this in mind, even the discernible differences that are found between these levels of use require a cautious and careful interpretation.

Low, medium and high users: capturing the ‘hard’ data

There are certain features within a small firm that are tangible and which can be readily measured. In this context, hard data is defined as information that is substan-
Figure 1: Types of small firm ICTs user is a relative concept

Low small firm users of ICTs

This group are typically a subset of the small firm population grouped towards the low end of ICT use. They range from those who have no information technology to those firms with stand alone PCs. In these firms, the primary route for IT is its introduction into the office (the automation of office functions) well before it is integrated into the production process, or in service delivery. Responsibility for decision-making, development and use of IT lies usually with the owner-manager, and importantly the idea of information and communications technology does not fit so well with the mental concept held within the firm of the business. For instance, telephone systems are perceived as a distinct tool with a different purpose compared with computerised information systems.

Medium small firm users of ICTs

In this group of small firm users, it is possible to see a more visible use of IT in the business. Typical features, in addition to those outlined previously for low users include: greater levels of IT (technological) expertise available within the firm; some evidence of IT and communications technology operating as separate systems within the firm; a tendency towards networked information systems and use of fileservers that allow more open access to company data; evidence to suggest use of IT in the production process, such as computer numerically controlled machinery and even some limited use of e-mail. There is evidence of greater planning and the delegation of IT responsibilities within the business, which would incorporate developments in ICTs. Finally, medium users would experience a number of routine upgrades of hardware and software technology, and become accustomed to a continuous process of thinking about IT and how it affects the business.

High small firm users of ICTs

Grouped towards the high end of use, many firms in this category exhibit signs of a much more sophisticated understanding of ICT and how the technology can be applied. In fact, there is some evidence that use may well be leading edge and innovative. Small firms in this group of users will be thinking about how to integrate ICT into their business much more fully, attempting to ‘informate’ their business processes. The trend in these firms is for digital communications systems to replace analogue systems, meaning seamless interaction between speech and information analysis. File transfer facilities, use of electronic data interchange, e-mail and worldwide web pages were common in these firms. High users are well on the way to recognising how the technology can be used to influence the support structures and
primary activities within the business. Not only will IT be planned on a much more structured basis but ICTs will have become a formal responsibility, probably delegated to a dedicated person, such as the IT manager.

**Low, medium and high users: capturing the ‘soft’ data**

In addition to those characteristics, which are visible, small firm use of ICT is also related to the more qualitative aspects of running a small business. These may be subjective beliefs of key personnel such as owner-managers, guided for instance by previous experiences of technology, or with previous dealings with particular technology suppliers. In this sense, soft data is defined as information that is less tangible and is therefore measured somewhat qualitatively. Together with the above, this soft information gathered from the semi-structured interviews, helps to form a more holistic model of small firm ICTs use.

*Low small firm users of ICTs*

One distinguishing feature from this group is how the small firm separates, or almost marginalises, IT use from the day to day operations of the business. Planning for IT is felt to be important but is usually approached in a conservative and cautious manner. Buying technology needs to be justified on a strong ground of need, which in turn is determined by a wide range of factors, such as looking for productivity increase through more automation. Need is often felt by the owner-manager to be an immediate thing, reacting to here and now problems that require an almost instantaneous response. Under such circumstances, IT can appear to be a very seductive asset that provides universal business solutions. However, for low users integrating the technology into the business is not a major issue in the firm precisely because it is a limited part of the firm. In some cases the technology is deliberately kept away from the main business objectives and processes. As a result, time spent on conceptualising the value of ICTs is very limited, if indeed, it is carried out at all.

*Medium small firm users of ICTs*

A major difference between medium and low users is that in this group someone in the firm, such as the owner-manager, has begun to develop a better understanding of the subtle difference between IT and ICT and how the respective technologies can be used. In this group, often the integration of IT into the small firm is conceptualised by the owner-manager as something evolutionary, which itself throws up a barrier for development because ICTs do not fit into business processes in the same manner as IT. There is also evidence in this grouping of speculative investment in ICTs, as firms explore and experiment with things such as e-mail connection and world wide web pages. Such speculative activity is based on the perceptions held by individuals in the firm about the future potential from ICTs and can often lack a solid business rationale.

*High small firm users of ICTs*

One of the key features of the high user group is how the small firm, through key personnel, is able to ease the technology into the business processes of the firm. In this way the management of ICT is a carefully thought out process. It evolves from an initial conception about how the technology can fit with the business and then develops through further thought about how this will ultimately shape development of the business. Also, in the high user group there is much less speculative ICTs development because adoption is based on a strong business rationale and, therefore, there is evidence of higher degree of levels of ICT preparedness in the firm, such as the availability of financial and technological resources. It is also easier to see how exogenous factors influence this type of firm, particularly innovation and ICTs adoption that operates across specific sectors, such as new media, advertising and marketing.
Discussion: what triggers small firm use of ICTs?

It is easy to recognise from Table 3 that many characteristics of use overlap between user types. One conclusion to begin to draw from this is how migration from low to high user is not necessarily a linear process but involves crossing complex, fuzzy and dynamic boundaries. Without appearing to be too relativistic, the features that prompt small firms to use ICT may well be idiosyncratic to any particular firm. However, there are also many exogenous characteristics in the business environment that affect levels of use. For those concerned with the barriers and opportunities for adoption, and with implementation and successful management of the ICT process, the difference between user types and causes of use should be of particular interest.

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<tr>
<th>Table 3: Typical characteristics of small firm ICTs use</th>
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<tbody>
<tr>
<td>Low users of ICTs</td>
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<tr>
<td>Typical businesses include: commercial photographer; industrial fittings company; food wholesalers; greetings cards manufacturer.</td>
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<tr>
<td>‘Hard’ characteristics</td>
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<table>
<thead>
<tr>
<th>‘Soft’ characteristics</th>
<th>Low users of ICTs</th>
<th>Medium users of ICTs</th>
<th>High users of ICTs</th>
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<tr>
<td>‘Soft’ characteristics</td>
<td>Very limited speculative IT investment; Cautious identification of technical-business specifications; IT purchase based on strong justification of need; Need determined by a number of factors, such as looking for productivity increase through automating particular routines; Reactive to here and now problems which face the business, which in turn often determine need; A low level understanding of the difference between IT and ICTs; A narrow vision or desire to be innovative.</td>
<td>A more sophisticated business rationale to employing technology in the firm is found; Price is not the determining factor to purchase; Some speculative investment, such as e-mail connection and world wide web pages; A tendency towards drawing out more productivity gains and efficiency improvements from using IT; Evidence that IT can support ‘quality’ improvements in the business, such as managing data for knowledge, adding to the quality of customer service etc.; IT fits in with business processes, but some difficulty in identifying a business case for using ICTs from this group.</td>
<td>A business rationale is well articulated for ICTs use, based on structured requirements and a justification of purchasing plans; Much less speculative ICTs development or investment; Clear levels of preparedness, such as available financial resources, and importantly, greater technological sophistication is demonstrated; The owner-manager has strong perceptions of the benefits which will materialise from using ICTs; Evidence of the importance of exogenous features, such as sectoral developments, influencing decisions to adopt.</td>
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**Internal business factors which affect small firm use of ICTs**

Many of the initial endogenous business factors that affect levels of use will relate to the health, state and condition of the business. There are many internal factors which influence how and why small firms use ICTs, reflecting the constant dynamics of change small firms experience. Many of these changes take place cumulatively over time and ultimately this changes the nature of the small firm itself. For example, one internal drive for using ICT can come when the firm captures new markets. The challenge for many small firms is to maintain their markets, or, to find new markets and to absorb the increase in work into the business processes currently established.
in the firm. While this can induce a stage of growth it will also affect how firm—supplier and firm—customer relations develop and may well lead to new investment and new product development.

Another highly significant internal factor shaping use is the point when the firm reaches a stage of change, for example in terms of expansion, down-sizing or relocation. Technology is often considered to be a major productivity inducing factor and at this point, the owner-manager may consider IT, or ICTs, as a necessary instrument to help manage change. Typical of this is one firm, a design and advertising company in the North West, who began with stand alone computers, moved on to an internal network using colour printers and scanning technology and then installed hardware and software to give them full access to the Internet. As the Accounts Manager from this business explained:

‘... and the fact that you can send e-mails or you can use ISDN to send stuff it’s ... Australia is a better example because you’re working, if you’re relying on faxes or ringing people, when basically you can’t ring them or if you’re relying on faxes or couriers you’ve got at most a two day sort of timeframe ... whereas if you’re using e-mail, FTP or ISDN then obviously you’re still able to work in a 24 hour sort of timeframe. So, you can send them stuff here and then while we’re all tucked up in bed at night they’ve got it and they’re getting on with the job. They’ve then sent you an answer when they finish, we come back in and it rolls continually then, obviously with the US as I say it’s better because we were actually working on the same day together then, albeit in the afternoon, so it still speeds things up.’ (authors interview, February 1998)

While technology suppliers will encourage the owner-manager to use the technology in this way the business maintains its communication with other customers and suppliers on-line and in real-time and builds up a trade with ‘absent others’ (Giddens, 1990). As this instance demonstrates, owner-managers do not seek the technology because of its sophisticated potential. The key motivating features for owner-managers at this point are more likely to be grounded in the dynamics of the business, such as the rewards which can be gained by taking the business in a particular trajectory. This social shaping occurs precisely because technology cannot guarantee any particular path of development and clearly, the internal drive for ICTs requires a refined conceptualisation of the way the technology ultimately fits with the perceived business path.

Further instances of internal pressures that trigger ICT adoption is when there is a change in the levels of expertise within the firm. For instance, if there is a resignation or retirement of key employees, or if new employees are hired, who bring with them new technological skills. Coupled with this is the issue of available financial resources. In all but the most irregular of cases this will be wrapped up in some other form of change, such as product or process development, or a particular stage of business development. One owner manager illustrated the nature of such change:

‘... at the end of August ’96 the company was bought from its previous owners. The founder had died and the daughter wanted to return to normal family life so she put it up for sale. At that time they were running, they had an aged 386 machine ... that was the sole IT technology. So since then we’ve fairly quickly introduced a network with voice data facility and we’ve been expanding. (authors interview, March 1998)

This business moved, in less than two years, into on-line communications such as e-mail and banking services, a networked database across the company for seven users and a voice data network. The objective of this was to upgrade ‘modern management controls including obtaining management information quickly’ (interview with owner-manager, March 1998) to underpin the firm’s formal management structure.

High users are often in the most favoured position of having technological expertise alongside business expertise and this provides a potent internal influence on ICT use. Alternatively, low and medium users are much less capable of fully integrating the technology into the business precisely because they are not fully cognisant of what and how ICT can be applied to their business activities. As we have suggested, low users often separate the IT functions away from main business activities, or at best, use them as office automation functions.
External business factors which affect small firm use of ICTs

The scope of exogenous factors that affect small firm use of ICTs is obviously wide ranging. Although location and sector clearly need to be taken into consideration we have concentrated much less on these in this study. There is surely a geography of ICT use in the UK or a drive for use experienced specifically in a particular sector but we have not pursued these issues here. Undoubtedly, this domain requires further work.

Yet we can also recognise that external factors validate our belief that ICTs and their use in the small firm is a socially shaped phenomena. The following is an extract from an interview with a retail and wholesale business manager, a firm established for 22 years and employing six people. The manager shows how external factors are leading to a defensive and pessimistic position in the business:

‘...a huge new model supermarket has opened up here within one mile of us, two years ago. It had a devastating effect on the local small shops of course. I immediately lost, within three weeks of them opening, I lost two customers and their total business to me was approximately £4,500 per week.’ (authors interview, February 1998)

The manager was then prompted by the researcher to think about what kind of influences might address this weakening business situation by suggesting

‘If you were looking to the future to remain competitive, as it were, can you see a need ... a point where you’d have to say ok we’re going to have to change our systems here, we’re going to have to update our tills and use a more ...’

The owner-manager interrupting

‘... eventually we will have to update our cash registers so that a customer gets a good receipt. The other thing we will have to do eventually is give delivered trade I think. Perhaps put a delivery charge on it within a certain area ...’ (authors interview, February 1998)

Clearly, the technology is a low priority and makes sense only in the context of existing business processes. Systems change—a distinctive jargon in the world of technology—is interpreted in terms of shaping the human delivery system.

In contrast a manufacturing firm making high pressure hoses, employing around 50 people, became influential within its own business sector. This firm is held up by the manufacturers of a particular computer-based production technology as an example of best practice. The chairman of the company explained:

‘... we have got equipment which is, does use computer programs and we are actually, as well as using those machines in our production process we do also represent the manufacturers of the machines in the UK ... we identified that that was a role we could play and you know it’s a way of increasing our sales and we also, we service the machines as well and it’s something that we’re actively marketing at the moment and we’re finding all sorts of different applications for these machines’ (authors interview, March 1998)

Not only did this firm embrace new technology, they now say to other small firms ‘we are using this technology in this way and we can recommend it to you’ demonstrating its reliability and showing, to a wider audience, how it can be used.

Two other contemporary external drivers to ICT use involve the strategies of the private technology suppliers themselves, and the policy initiatives of government. It is interesting how government and major technology suppliers have driven the ICT agenda forward as a universal issue and they have not sought to look for specific sector or geographical application (Fuller and Southern, 1999).

Many powerful technology suppliers have identified and are targeting small firms as a major growth market for ICTs. These include telecommunications companies such as BT, but also the newly arrived cable companies which operate at a local level, who have been able to develop low cost ICTs connection through the deregulation of the telecommunications sector.4 The major hardware companies such as Intel and

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4 Mobile telephony companies are also viewing the small firm sector as a major market for a range of goods and services.
Compaq see the small firm sector as a market waiting to happen, and third channel operators such as PC World can also be influential. Then of course there are the software companies, most notably Microsoft but also application specific software makers such as Sage who make accounts packages. As the technology suppliers develop their marketing strategies they are increasingly becoming aware of issues such as the quality, reliability and robustness of their product, the form and delivery of after sales service, training provision, maintenance agreements, and brand reputation. The small firm faces a whole array of enticements and logics to adopt ICTs.

Many technology suppliers have also been incorporated into recent work initiated by the government to set out a new policy framework for the information society. Policy mechanisms which encourage small firms to use the technology are based on the notion that increased usage will improve firm performance, and ultimately support the competitive position of the nation (Fuller and Southern, 1999). This is a major responsibility for the small firm sector to shoulder and is too loosely based on the assumption that benefits for the business will accrue as new information processing technologies are adopted (Scott-Morton, 1991). As the difference between user type indicates such an assumption is based on a very inadequate foundation. It is not likely that national competitiveness is an issue that will determine ICT adoption by owner-managers, although the supply of technology through government sponsored programmes may well pervade many business activities. Pressures to adopt come from many different directions including customers and suppliers in the supply networks, competitors, technology suppliers and government.

Summary

In a time of hype and less than substantiated claims about dot com businesses, and the information age in general, the typology developed in this study has three main contributions to make to the issue of ICTs and small firms. First, the typology is constructed solely from a small firms' perspective that draws on a qualitative approach to studying technology in its business context. The analytical framework that the typology suggests avoids charges of technological determinism and illustrates how the social shaping of ICTs is grounded in the technological experiences of key personnel in the small firm. Second, the typology is neither based on, or assumes, any particular need for ICTs to be present in small firms. In fact, the object under study was primarily the small firm and not ICTs, so it at least verifies that ICTs is an emerging phenomenon in the small firm domain and that this is a relevant issue for small business researchers. Third, it is quite important that the typology allows key characteristics of small firm ICT use to be mapped out. These attributes of use are based on the visible presence of ICTs and the less tangible perception of owner-managers on the way ICT should be used. There is an opportunity to develop this typology to a greater level of sophistication as other researchers investigate this phenomenon.

Too often, measuring small firms use of ICT in quantitative terms only misses the complexity of the relationship between small firms and the technology. There can be no simple formulae set out to indicate how and why small firms will adopt, implement and then successfully manage ICTs. As this article has indicated there are both exogenous and endogenous factors influencing small firm take up of ICTs. The three ideal types of user, those of low, medium and high user, each contain a dynamic set of processes that overlap and indicate how there can be no fixed boundaries operating around small firm use of ICT. When small firms use the technology complex relations unfold. It is by no means a simple linear development whereby observers can expect an incremental build up of knowledge and expertise on ICT to be established within the firm. It is perfectly feasible for the opposite to take place as knowledge is lost when personnel leave, or distorted through the aggressive marketing of technology suppliers, advice from consultants and government initiatives. Further work is required, not only to investigate in greater depth and to rigorously
test the issues raised by this typology, but to work towards a more thorough conceptual base for understanding small firms and ICTs.

References

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