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# A multidimensional framework for SME e-business progression

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## Abstract

**Purpose** – This paper sets out to critique the applicability of e-commerce staged models in explaining the progression of small and medium-sized businesses (SMEs) in their use of internet technologies. The premise of this study is that examining the evolution of web sites over time gives us insights into actual evolving strategies and motivations behind internet investments.

**Design/methodology/approach** – An alternative multidimensional framework is proposed that combines three different dimensions of organizational change (process, content, and drivers). The content or categories of the dimensions are defined and justified. A study of 192 web sites and their evolution is described. This helps to demonstrate the relevance and applicability of the dimensions of the framework.

**Findings** – The study describes the different approaches (monitoring, content analysis and case studies) and the characteristics of changes on these web sites. It was found that the main evolution strategies were “content updates” and “dormant sites”. In addition, the majority of companies seem to have evolved their web sites to refresh the image and change navigation protocols and not to add transactional e-commerce features.

**Practical implications** – The proposed framework is argued to be useful to academics, providing multiple perspectives, enabling more insightful study of SMEs’ e-business adoption and progression, and avoiding over-simple a priori theory, e.g. staged models. The framework is also argued to be useful for SME managers seeking to make the most of their limited resources in this context.

**Originality/value** – The paper provides a multidimensional framework which is new and comprehensive. It also provides some research findings using the framework relating to a pilot study of 192 SME web sites. Little prior research has been carried out on the evolution of SMEs’ web sites, in terms of the type of drivers, the features that have been incorporated over time, and how they have changed.

**Keywords** Worldwide web, Small to medium-sized enterprises, Electronic commerce, Organizational change

**Paper type** Research paper

## Introduction

It has been suggested that small and medium-sized businesses’ (SMEs) adoption of internet technologies follows a sequence of stages. These staged models imply that businesses move in stages from basic use of the internet (as an e-mail or marketing tool) to more sophisticated usage that redesigns business processes and integrates business systems. It is assumed that greater benefits will be obtained when a company engages in a process of business transformation (Chau, 2003). The stages theory has been widely used as a way of examining the adoption and progression of various aspects of e-commerce in organizations. Conceptual models depicting the stages

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involved in the development of internet systems have appeared in the literature (e.g. Earl, 2000; CBI and KPMG Consulting, 2001; Rayport and Jaworski, 2002). There have also been a number of papers that seek to identify and describe the different phases that SMEs move through with respect to the sophistication of their use of internet technologies (e.g. Daniel *et al.*, 2002; Rao *et al.*, 2003).

Within these models, the early stages of internet adoption are typically characterized by organisations gaining access to the internet followed by the use of relatively simple technologies (e.g. e-mail) to dispense and gather information. Subsequent stages relate to the establishment of a simple static home page containing basic information. Later the business starts to publish a wider range of information and attempts to market its products and perhaps provide some after-sales support. E-commerce deployment is next, allowing the users of the site to order and/or pay for products and services. In the most mature stages the company web site is fully integrated with the various back office systems such as enterprise resource planning (ERP), customer relationship management (CRM), and integrated supply chain management (SCM) applications.

In recent years, governmental programs of the UK, the European Union and other governments have used these kind of “one-size-fits-all” staged models to encourage SME e-business adoption (Department of Trade and Industry, 2002; SIBIS and European Communities, 2003; Industry Canada, 1999; National Office of the Information Economy, 2000). However, despite the efforts of governments and the various support programs, the number of SMEs achieving advanced stages of e-commerce is very low and lags behind larger companies in their use (Department of Trade and Industry, 2003; CBI and KPMG Consulting, 2002; European Union, 2003). For example, nearly a third of large European enterprises have implemented an electronic CRM system and 13 per cent are users of an electronic SCM system, compared with only 10 per cent (CRM) and 3 per cent (SCM) of SMEs (European Union, 2003). Recent research reveals that e-commerce initiatives in SMEs are mainly still at the initial stages, not progressing much beyond e-mail and simple information-based web pages (Brown and Lockett, 2004; Levy and Powell, 2003; Oliver and Damaskopoulos, 2002). Similar findings have been made in other countries, and concerns have been raised as to why government-led adoption programmes for SMEs are not more successful (Stockdale and Standing, 2004).

The picture is perhaps even worse because there is evidence that many SME web sites that were initiated and developed have not progressed over time but remain in a “dormant” stage for a period of many months or even years. Indeed, several studies of e-business in the UK have actually reported a decline in the number of SMEs implementing trading online (CBI and KPMG Consulting, 2002; European Union, 2003; Department of Trade and Industry, 2003) and perhaps surprisingly, the use of web sites and e-mail has also declined (Department of Trade and Industry, 2002, 2003). The Department of Trade and Industry (2002) report found a 10 per cent reduction in the number of micro businesses selling online, while there was a 7 per cent increase for large businesses. Some suffer a regression, for example giving up e-trading or even switching off their web sites.

Although the stages of growth model is a popular approach to explain the evolution and progression of internet technologies adoption, there have been some criticisms and

suggestions that it is inadequate as a model to describe the actual adoption of internet technologies by SMEs (Levy and Powell, 2003; Martin and Matlay, 2001).

In an earlier paper, Alonso Mendo and Fitzgerald (2005a) identified some of its weaknesses as follows:

- an over-simplified perspective of complex issues and circumstances;
- based on a false assumption that firms progress from basic to more advanced use of ICTs in a linear fashion;
- a lack of empirical validation;
- a generalization that does not take into account the diversity of SMEs;
- a lack of consideration of other change theories (e.g. evolutionary models); and
- a focus on the broad picture of change in the industry, rather than individual instances.

The aim of this paper is to propose a broader multidimensional research framework as an alternative approach to staged models that addresses some of these concerns. The premise of this study is that examining the evolution of web sites over time provides insights into the actual evolving strategies and motivations behind internet investments. This work forms part of a wider research study into the evolution of the web presence of small business in the UK. The motivation for this research is to characterize and model the evolution of SMEs' involvement in e-business in terms of metrics and patterns as opposed to the identification of staged models. The objective of the wider study is to ultimately produce a predictive model, such that the evolution process of any given web site in its particular context can be categorised and its management better supported.

Such a model is currently lacking and is likely to be especially useful since investment in ICT typically forms a significant part of the limited resources and skills of SMEs, and therefore it is important that these investments are carefully planned to minimize the risks and ensure the desired benefits. This paper reports on progress so far and is organised as follows. First, different theories and models that have been applied to study the progression of SMEs in this context are introduced. Next, a multidimensional research framework looking at the process, content, and drivers of change is proposed. Then some preliminary results of a pilot monitoring and content analysis of web sites are described, illustrating the use of the developed framework. Finally, some conclusions and implications are suggested.

### **Approaches to SMEs' e-business progression**

The organizational adoption of internet technologies or strategies has been studied from a variety of different perspectives. These approaches utilise different driving forces behind the evolution of such adoptions. For example, institutional theory rejects the organizational actors' rationality and claims that the structure and behaviour of an organization are shaped by the characteristics of the environment in which it operates (Scott, 2001). Thus, organizations within a particular industry tend to look like each other over time, as competitive and customer pressures motivate them to copy one another's practices regardless of efficacy (DiMaggio and Powell, 1991). In this context, the institutional environment in which the firm is embedded may influence the adoption of internet technologies. This environment

("organizational field") is formed by a group of organizations providing similar products or services with the major suppliers, customers, owners and regulatory agencies, creating incentives and barriers to adoption and use. Therefore, the decision to adopt e-commerce, rather than being a purely rational and internal decision, is likely to be induced by external pressures from competitors, trading partners, customers and governments. The use of this approach, rather than the stages theory, helps to explain, it is argued, repetitive practices in a non-deterministic fashion, and change is seen as part of a wider set of dynamic industry practices (Lamb and Davidson, 2004). There is not a predetermined end point, as in the staged models, but instead change is seen as a reaction to external demands, institutional variables, and the particular environment faced by the firm.

Further, there are both exogenous and endogenous factors influencing the adoption, implementation and the successful management of ICT (Southern and Tilley, 2000). Indeed, according to Storey (1994), progression seems to occur when the appropriate combination of factors takes place, these being the characteristics of the entrepreneur(s), the characteristics of the firm and their strategy or managerial actions. For example, Martin and Matlay (2001) found the reactive or proactive approach of owners to rapid technological changes in the marketplace to be crucial to ICT adoption and implementation. In addition, Mehrtens *et al.* (2001) identified perceived benefits, organizational readiness and external pressures as the main factors that influenced adoption decisions.

A number of authors have also developed contingent role models as alternatives to staged models of internet adoption. The idea behind these models is that different types of business will view internet adoption in different lights. E-commerce can be approached in many different ways depending on the specific business processes that might be carried out through the internet (Tagliavini *et al.*, 2001). Thus, several internet usage profiles or approaches are possible. This perspective assumes that a company purposefully determines which profile or combination of profiles best suits its particular business context and strategy. Tagliavini *et al.* (2001) identified five e-commerce approaches:

- (1) public relations;
- (2) company promotion;
- (3) pre/post sales support;
- (4) order processing; and
- (5) payment management.

In a similar vein, Boisvert and Begin (2002) suggest that the five internet user profiles or roles are important. These are:

- (1) promoter;
- (2) developer;
- (3) vendor;
- (4) integrator; and
- (5) PR officer.

Levy and Powell (2003) identify four roles for internet technologies in SMEs:

- (1) brochureware;
- (2) support;
- (3) opportunity; and
- (4) development.

Their model implies “transportation” from one use to another without the implicit idea of growth included in the staged models. They suggest that different businesses will focus on different roles depending on the owner’s attitude to growth and perceived internet value. This variety of different perspectives on the progression of SMEs in relation to internet technologies suggests a need for a broader multidimensional framework to be adopted in its study.

### Research framework

This section proposes such a framework to help understand the evolution of e-business practices within SMEs. While the framework itself is new, the contents of the dimensions and elements in the framework are partly, although not totally, derived from existing literature and studies. It is hoped that this combination of a variety of different perspectives will provide a more fruitful approach in the future.

Change theories have provided important perspectives on implementation issues of computer-based information technologies in general (Wilkins *et al.*, 2000): for example, ERP systems (Boudreau and Robey, 1999) and electronic data interchange (EDI) (Chan and Swatman, 1998) have been analysed as change processes as well as technological diffusions. Implementation can also be seen as an organisational change process that extends over time (Walsham, 1993; Lucas, 1994). Thus, it is suggested that a change perspective could provide a useful lens through which to view SMEs’ web site evolution. However, there is relatively little research evidence to explain why and how organizations evolve their web presence over time, and less that examines this as a set of change sequences. What would be very useful would be to study different implementation process patterns by examining empirically the sequences of changes that occur during the implementation process over time. For example, it has been argued that the sophistication and complexity of a firm’s web site reflects its electronic commerce strategic objectives, since the web site is the portal through which most electronic transactions are conducted today (Kowtha and Choon, 2001). Depending on the organization’s internet strategy, its web site will have different functional characteristics. The extent of the features provided on web sites tends to increase when the internet adoption progresses from lower to higher levels, involving more technical investments (Teo and Pian, 2004). Therefore, studying how web sites evolve over time is likely to be an important way to study the progression of electronic business adoption by SMEs.

Given the variety of definitions associated with organizational change, it is important to establish a clear indication of what is meant by change and how these concepts might be applied to the context of change in web sites. Levy and Merry (1986) suggest that organisational change in organizations can be viewed in three dimensions:

- (1) the process of change;
- (2) the content of the change; and
- (3) the reasons for change.

Each of these dimensions provides a particular lens for viewing change. The first dimension is concerned with how change occurs, for example continuous (incremental) versus episodic (discontinuous) changes in a sequence over time (Weick and Quinn, 1999). The second dimension focuses on what the changes are, examining the empirically observable differences in the form, quality or state of an entity over time (Van de Ven and Poole, 1995). The third dimension examines why change occurs, focusing on the forces and sources for change (Pfeffer, 1982). These dimensions were utilised to create the framework (Figure 1) and pose the research questions, as follows:

- How do SMEs change their web sites (process of change)?
- What kind of changes do SMEs make to their web sites (content of change)?
- Why do SMEs change their web sites (drivers of change)?

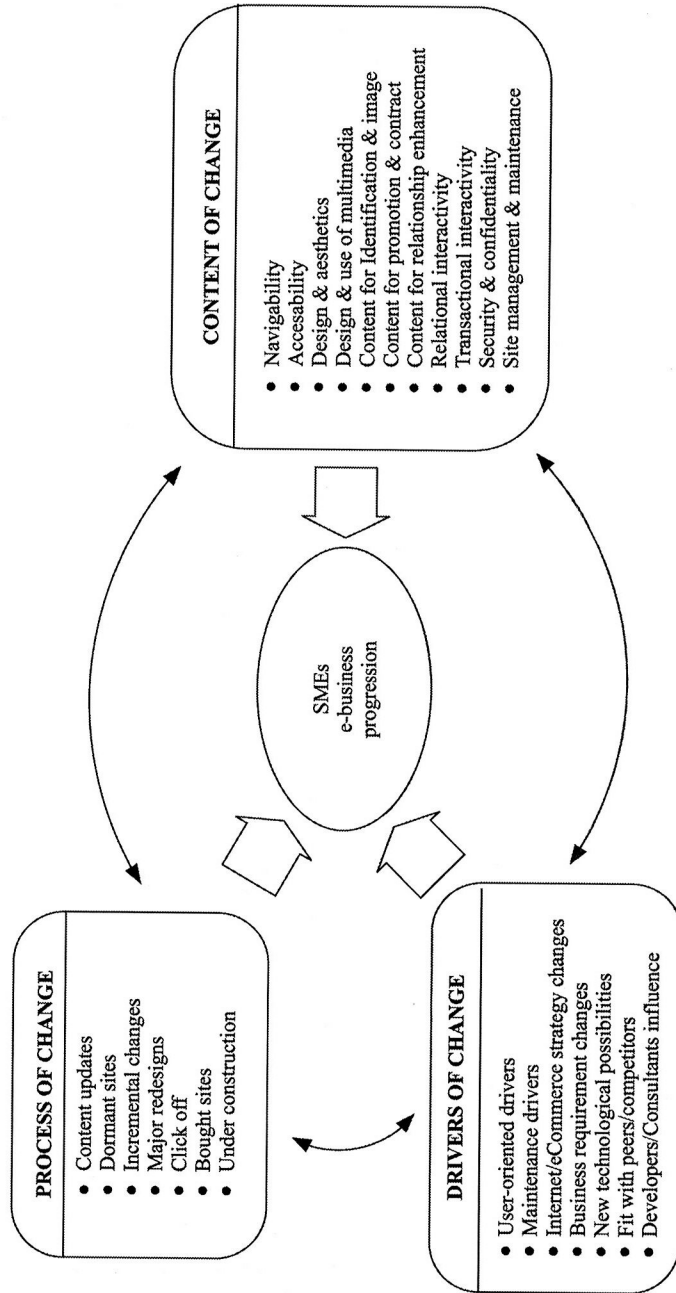
These dimensions form the core of the framework and each will now be examined.

#### *Process of change*

In order to understand the dynamic nature of web sites, some studies have collected and monitored a sample of sites over time, for example in relation to mortality rates (McMillan, 2001), and constancy and permanence (Koehler, 1999). The survival and evolution of web sites seems to be related to diverse factors, such as the extent of resources invested in the web sites, technological expertise, organizational commitment to web-based communication, management support, site traffic, the targeted audience, etc. (McMillan, 2001). In addition, different evolution strategies have been identified as:

- no evolution;
- minor corrections;
- managed redesign;
- multi-developer maintenance; and
- database (Boldyreff *et al.*, 2001).

One of the approaches to understanding change in organizations is by identifying change as being either episodic (discontinuous) or continuous (incremental) (Weick and Quinn, 1999). Episodic change refers to changes that tend to be infrequent, and intentional, often involving replacement of one entity with another. These changes may occur in periods of divergence when external (e.g. technology change) or internal (e.g. change in personnel) events move the organization away from its equilibrium conditions. Continuous change, in contrast, is seen as ongoing adaptation and adjustment, characterised by continuing updates or accommodations of work processes and social practices (Weick and Quinn, 1999). Referring to changes in web sites, Ryan *et al.* (2003) used these concepts to distinguish discontinuous changes or re-designs and incremental changes. They defined discontinuous change as “a sudden, major shift in a Web site between two points in time” that “involve more than mere alterations in appearance, such as changes in the number, nature, and organization of pages that constitute a site” (p. 657). Incremental changes, in contrast, “occur with normal maintenance of web sites” (Ryan *et al.*, 2003, p. 657).



**Figure 1.** Framework for investigating the progression of small and medium-sized businesses (SMEs) in their use of internet technologies

Major redesigns, according to Hudson (2000), can be counterproductive, as users generally do not like rapid, drastic changes to their interfaces. A completely new web site can frustrate users by depriving them of a familiar system and forces them to re-learn the site, reading content and scanning links for the material they need. Instead, an evolving approach, with gradual and continuous improvements, has the advantage of presenting a consistent look to the user and not surprising them with a new design, only having to adapt slightly to new components (Ryan *et al.*, 2003).

Boldyreff *et al.* (2001) proposed a different set of categories as to how web sites evolve:

- no evolution;
- minor corrections;
- managed redesign;
- multi-developer maintenance; and
- database.

The framework proposed here adopts the following comprehensive set derived from the above studies:

- *Content updates* – represents common maintenance of web content without changes in the functionality, look and feel or features of the web site. For example, addition of news about the company changes in prices and even daily automatic changes (e.g. number of visits, number of members or share prices).
- *Dormant sites* – corresponds to cases where there were no apparent changes or updates during the monitoring period.
- *Incremental changes* – characterizes upgrades that occur with the normal maintenance of a web site that does not entail a major redesign, for example adding a privacy policy page, adding a site map or deleting some pages.
- *Major redesigns* – denotes sudden and major shifts in a web site between two points in time. These involve more than mere alterations in appearance and imply changes to the number, nature, and organization of pages that compose the site.
- *Dead sites (click off)* – represents web sites that have disappeared and no longer exist at the end of the monitoring period. Their domain was found to be unavailable or their URL produced an error.
- *Bought sites* – companies that were found to have been bought during the monitoring and now redirect to a different company.
- *Under construction* – displayed at the end of the period an “under construction” page while the web site was being redesigned.

#### *Content of change*

Benbunan-Fich and Altschuller (2005) use qualitative content analysis of press releases concerning web site redesigns, and found that the majority of their 212 cases expanded information and changed navigation protocols, improving the usability of their web sites. However, only about 20 per cent added e-commerce features, such as online



ordering or community communication channels (Benbunan-Fich and Altschuller, 2005). In a further attempt to analyse the evolution of functional characteristics of commercial web sites over time, Yeung and Lu (2004) proposed a set of quantitative web site attributes (such as number of pages, text volume, number of multimedia, number of hyperlinks). It was found that while the web sites generally grew larger in content and number of pages, there were only marginal increases in their commercial provisions and e-commerce functions (such as online sales). Another approach has been to ask the customers and visitors to the web site to evaluate it (e.g. Barnes and Vidgen, 2001).

Automated evaluation approaches have also been used that deploy software tools to analyse web sites and collect information on key quantitative characteristics of a large sample of web sites (e.g. Ivory and Hearst, 2002). Finally, the product-based approach measures the presence, absence, or quantity of certain features or components in a web site. Such content analysis intends to measure the development of a web site focusing on externally perceivable aspects of the potential functions accomplished by the web site (e.g. Azzone *et al.*, 2001).

This automated evaluation approach was found to have a number of benefits and a product-based web evaluation approach was adopted in this study (Alonso Mendo and Fitzgerald, 2005b). Consequently, 11 categories relevant to web site evaluation were selected based on an analysis of previous web evaluation studies. They are listed in Table I together with their sources.

Evaluation categories	Examples of features/components
Navigability (e.g. Barnes and Vidgen, 2001) Accessibility (e.g. Loiacono and McCoy, 2004)	Menus, sitemap, path followed, in-site search Text-only version, links to plug-ins required, search tags
Design and aesthetics (e.g. Barnes and Vidgen, 2001) Design and use of multimedia (e.g. Barnes and Vidgen, 2001)	Space allocation, colours, readability, scannability, and layout Graphics, images, audio and animations
Content for identification and image (e.g. Boisvert, 2002) Content for promotion and contract (e.g. Adam <i>et al.</i> , 2002)	Company profile, history, mission and values, customers' testimonials, press releases Electronic catalogue of products, services offered, conditions regarding financing, guarantees and payment
Content for relationship enhancement (e.g. Boisvert, 2002) Relational interactivity (e.g. Barnes and Vidgen, 2001)	FAQs, related products links, generic information, financial status of the firm, careers information Adaptive messaging/alert on company information or products/services, customisation of the web site, discussion groups, guest books, login pages, chat
Transactional interactivity (e.g. Adam <i>et al.</i> , 2002) Security and confidentiality (e.g. Barnes and Vidgen, 2001)	Online ordering, direct sales and payment Security certifications, entry in secure zone of site
Site management and maintenance (e.g. Barnes and Vidgen, 2001)	Last update date, webmaster link, dynamically generated pages

**Table I.**  
Web evaluation categories

### *Drivers of change*

Organisations are frequently evolving their web sites: in fact, according to a survey by Jupiter Research (“web site spending and governance trends”) 58 per cent of companies said they planned to re-launch their site in 2004 (Slavens, 2004). However, there are different forces or factors that drive these changes (or indeed contribute to the sites not changing). In trying to explain organizational change, four categories or theories have been proposed in the literature. Each theory relies on a different “motor of change” identified as:

- life-cycle;
- teleological;
- dialectical; and
- evolutionary (Van de Ven and Poole, 1995).

These categories were later adapted and applied by Ryan *et al.* (2003) to help explain the reasons behind web redesign. The drivers were:

- marketing reasons (e.g. to refresh an old and dated organization’s brand image);
- rational reasons (e.g. to increase effectiveness or efficiency and better accomplish the organization’s goals and objectives);
- political reasons (e.g. to reflect new political regime in the organization); and
- institutional (e.g. to achieve a better fit with the web sites of other companies in their sector) (Ryan *et al.*, 2003).

Rational reasons were found to be the most important, followed by marketing, institutional, and political. The authors suggested that, as in other IS development projects, the justifications for web investments frequently had to do with improving functionality and ease of use. In addition, marketing reasons were important as organisations compete for the attention of web users, who may cease to find the web site interesting when pages go unchanged for a while or look dated (Ryan *et al.*, 2003).

Web site redesigns have also been explained as attempts on the part of the firm to:

- implement new technology possibilities;
- alter their e-commerce/marketing strategy regarding the purpose of the web site; and
- better accommodate their users/customers needs (Benbunan-Fich and Altschuller, 2005).

Furthermore, it was found that the need to adjust the web presence and the desire to transform the site into a more effective communication tool were the main drivers for many of the web site transformations undertaken in the period of study (1995-1999).

Conducting research with a single preconceived change theory in mind has the risk of oversimplification and obtaining only a partial account of the development and change process at the expense of others (Van de Ven and Poole, 1995). For example, researchers using an a priori staged model may expect a certain number of stages of development to occur and find their results becoming self-fulfilling prophecies (Boudreau and Robey, 1999). Organizational change is more complex than this and it

typically involves a number of simultaneous change drivers, interacting with each other.

In this study, a preliminary classification of drivers of web site change, based on the above literature, was undertaken and further refined based on a qualitative content analysis of web site redesign case studies and press releases (Alonso Mendo and Fitzgerald, 2005c). The resulting categories of drivers are identified as:

- user-oriented drivers;
- maintenance drivers;
- internet/e-commerce strategy changes;
- business requirements changes;
- new technological possibilities;
- fit with peers/competitors; and
- developers' influence.

#### *Interrelation of the dimensions*

Thus, the framework (Figure 1) consists of the three dimensions (process of change, content of change, and drivers of change), with the categories of each having been identified and elaborated. Further, the three dimensions are interrelated. Each dimension is a particular lens with which to look at the evolution of SMEs web sites. They allow the researcher to obtain a different picture of this phenomenon from diverse perspectives. However, these dimensions are not to be studied independently. As the arrows in Figure 1 suggest, the dimensions are related to each other and together provide a holistic view of the implementation of internet technologies in organizations. Under particular circumstances, specific combinations of drivers will cause the web sites to change in certain directions and in certain ways. For example, changes with the purpose of addressing the changing needs of customers or web users (driver of change) may entail changes in navigability and accesability (content of change). In addition, these changes may need to be made in an incremental way in order not to frustrate users (process of change). Changes of a different nature, such as those originated by maintenance in order to cope with the growing content and complexity of a web site may entail more profound changes in the management and maintenance aspects of the site, requiring a whole redesign, in this case. The dimensions interact in complex ways and thus should be viewed holistically.

#### **Pilot application of the framework**

This section describes a pilot application of part of the framework, the research method, and preliminary results. An empirical and quantitative approach was adopted which identified and observed changes to SME web sites over time. The advantage of this method is that it allows non-obtrusive data acquisition of actual changes in the web sites without explicit interaction with the organizations. A sample of 192 web sites was monitored over a ten-month period and the changes recorded. The sample web sites belonged to ten different business sectors and were selected from three business directories in the UK[1]. These data were collected to study the types and characteristics of changes on these web sites (process of change). A content analysis

was then performed based on the differences between the versions of the same web site over time (content of change).

#### *Monitoring of web sites*

In November of 2003, a copy of each of the web sites was made by downloading web pages using WebCopier v.3.5 (see [www.maximumsoft.com](http://www.maximumsoft.com)), an offline browser. This tool records entire web sites and stores them locally, allowing them to be analysed and compared (even when they have been replaced or changed on the internet). To ensure data consistency, once data collection had started, no new web sites were added. Another tool, Web site-Watcher 3.50f (see [www.aignes.com](http://www.aignes.com)) was used to compare the content of the companies' pages with those downloaded to detect any changes. This tool allows the automatic monitoring of web pages for updates and changes in menus, links and content. In order to monitor the evolution, data were collected monthly, from November 2003 to August 2004. Those sites where change was detected were then downloaded again to detect any further changes.

The 192 web sites were monitored for a ten-month period and a number of evolution strategies were identified. Table II shows the types of changes for the sample web sites, in order of magnitude.

Fifty per cent of the web sites had "content updates". This category (as "minor corrections") was found in previous research to be second in importance (Boldyreff *et al.*, 2001). It is interesting to note that the next most common category of change found in the sample is actually the absence of any change. Around 18 per cent of the sample web sites did not have any changes or updates during the monitoring period (dormant sites). Previously, this category was termed as "no evolution" and was found to be the most frequent. "Incremental changes" is the next category in our list, accounting for around 10 per cent of the sample (this category was not contemplated in previous research. "Major redesigns" were found in a similar proportion, around 9 per cent. This category (as "managed redesign") was found in previous research to be third in importance. Curiously, a similar proportion (9 per cent) of the sites disappeared along the way and no longer existed at the end of the monitoring period ("click off" cases). In previous studies about the permanence and mortality of web sites, this was found to be much larger: 18 per cent by Koehler (1999) and 27 per cent by McMillan (2001). Finally, three sites (2 per cent) were found to have been bought and now redirected to a different company. A further four sites (2 per cent) at the end of the period showed an "under construction" page while the web site was being redesigned.

Type of change	Number of sites	Percentage
Content updates	96	50
No change (dormant sites)	34	18
Incremental changes	20	10
Major redesigns	18	9
Dead sites (click off)	17	9
Under construction	4	2
Bought sites	3	2
Total	192	100

**Table II.**  
Evolution strategies

It is important to note that in some of the web sites, several evolution strategies appear to have taken place during the study, for example the same site having content updates, incremental changes and redesigns. This indicates that the maintenance process itself appears to evolve over time. However, for simplification and comparison purposes, in Table II each web site was allocated to only one category, that exhibiting the greatest degree of change. For example, when a site was found to have content updates and later a redesign, the site was counted in the redesign category. In addition, two of the web sites were redesigned twice during the study. Therefore there were 20 redesigns analysed (Table III) but only 18 web sites were found to have been redesigned (Table II).

In addressing the first research question (how SMEs change their web sites), a number of different evolution strategies were studied. As indicated above, there is some evidence in the practitioner literature about a design preference for ongoing incremental change rather than major redesign (Hudson, 2000). However, in this study they were found to occur in almost similar proportions (10 per cent incremental changes and 9 per cent redesigns). In addition, dormant sites were found in a significant number of cases (18 per cent) and quite a high number of sites that had disappeared (9 per cent). These two cases, dormant sites and disappeared sites, represent interesting avenues for further research, and the qualitative phase of this study will also try to examine the circumstances in which they occur.

#### *Content analysis of web sites*

The previous monitoring allowed the identification of a number of web sites that had been redesigned or incrementally changed during the monitoring period. Subsequent analysis explored the content of these changes. The method applied surveyed the new web sites in detail and mapped all changes detected. The detected changes were mapped to the 11 categories proposed in the framework (Table I). For each case, the categories were assigned a binary numerical code of "1" when there were features of that particular category affected and "0" when there were not. The categories of the framework were found to be comprehensive and relevant as all the changes could be placed in one or other of the categories.

Table III shows the analysis of the frequency of the web site dimensions changed during the redesigns. The first column of figures represents the absolute number of web site redesigns collected, where a given category was altered. The second column

Change categories	Frequency	Percentage
Design and aesthetics	15	75
Navigability	14	70
Content for identification and image	10	50
Relational interactivity	9	45
Content for relationship enhancement	7	35
Content for promotion and contract	6	30
Site management and maintenance	5	25
Accessibility	4	20
Security and confidentiality	3	15
Transactional interactivity	2	10
Design and use of multimedia	1	5

**Table III.**  
Frequency of categories  
changed

represents the same figures but in relative percentages (referring to the total number of redesigns analyzed, i.e. 20).

In relation to the second research question (what kind of changes SMEs made in their web sites), it was found that most of the redesigns in the sample involved the improvement of features “Design and aesthetics” (75 per cent) and “Navigability” (70 per cent). The next most relevant categories affected were the “Content for identification and image” of the company (50 per cent) and “Relational interactivity” (45 per cent) (any features to develop personalised relations with stakeholders, build interest and a sense of community). These frequencies suggest that the majority of companies evolved their web sites to refresh the image and change navigation protocols, rather than to add transactional features or other e-commerce facilities. These findings support the notion that e-commerce staged models are not the best way of to represent the e-business progression of SMEs, as such models assume that web sites grow in sophistication and functionality over time, whereas it would appear that SMEs more frequently simply refine their existing web presence.

The third dimension of the framework (drivers of change), and the interactions between the dimensions have not been examined in the pilot study. The case study methodology is argued to be useful when contemporary events are the focus of the research, and a strong theoretical base does not exist. In addition, it also allows the researcher to answer “how” and “why” questions in an area where few previous studies have taken place (Yin, 1994). Thus, a case study approach is being undertaken in relation to validating the drivers of change categories in the framework. It is hoped that the findings from interviews with the owners/managers of these companies will complement the previous analysis to get a more complete picture of the motivations behind the web re-designs. However, it seems that many of the redesigns and incremental changes analyzed are motivated by the need to improve the look and feel, expand content and enhance the navigability of the web sites, maybe in an attempt to achieve a more efficient communication tool. This would be in line with previous work, describing transformation of commercial web sites, that found a tendency to expand information and change navigation protocols, improving usability (Benbunan-Fich and Altschuller, 2005) and to focus on information convenience, site navigation and customer confidence (Piccoli *et al.*, 2004).

## Conclusions

The stages of growth model is one of the most common approaches to explain the evolution and progression of the adoption of internet technologies by organizations. However, this approach is not exempt from criticism, and other alternative models and approaches are to be found in the literature. This paper has proposed and justified an alternative multidimensional research framework, based on organisational change concepts, such that the study of SMEs’ web evolution can be undertaken in a more insightful way and in a way that better fits with empirical findings found in the literature. The framework consists of three dimensions:

- (1) process of change;
- (2) content of change; and
- (3) drivers of change.

The benefits of the framework are first, that in the context of research, it provides a range of different perspectives or lenses with which to study SMEs' adoption and progression of e-business, rather than single-dimensional approaches (e.g. the stages model). This should lead to better understanding of why and how SMEs evolve their web sites and internet strategies for supporting their web and e-business strategies. In addition, it facilitates comparisons of commercial web sites over time and in different regions of the world.

Second, it should be of benefit to managers, knowing the web site features that other companies in their sector (i.e. potential competitors) are implementing would be useful in relation to new internet investment decisions. In addition, they should know what features need to be provided in order to implement the most suitable internet strategy. Customers may have different views of the firm depending on the web features available. The presence or absence of various features or content may determine whether a customer visits the site again or engages in transactions (Teo and Pian, 2004). In all, being aware of the evolution of SMEs' web sites, in terms of the types of drivers of change, the features that have been incorporated, and how implemented, should be a valuable addition to what is known about e-business in SMEs, and will help to clarify the drivers (and barriers) that influence their adoption of more sophisticated internet technologies.

A pilot study was undertaken of 192 web sites which were collected and monitored over a ten-month period to identify the types and characteristics of changes on these sites. This pilot study has provided some interesting findings about the evolution and change of these web sites. It has also helped to validate the framework in that the categories identified in two of the dimensions have been found to be relevant, comprehensive and applicable.

The third dimension and the inter-relationships have yet to be finalised, but a qualitative study is being undertaken by interviewing owners/managers that will try to explain the circumstances in which the observed changes occur. It is hoped that this will further validate the relevance of the framework and that the findings will provide insights into success and failure factors of e-commerce in SMEs (e.g. the relatively significant number of observed dormant sites and "clicked off" cases). In addition, the sample of web sites is being increased to 2,000 companies in order to be more representative. It is hoped that further research, based on the framework, will produce a predictive model, so that the evolution process of any given web site, in its particular context, can be categorised and its management better supported. Such a model is currently lacking, and should be especially useful since continuous maintenance and innovation investments form a significant part of the limited financial resources, technical skills and knowledge of SMEs (Kowtha and Choon, 2001; Chau, 2003). Large firms enjoy access to capital, skills and capabilities to support their web strategies, whereas SMEs often lack these resources and capabilities, which makes it even more important that they maximise the potential and minimise the risk of e-business, and carefully formulate their strategy for current and future e-business (Barnes and Vidgen, 2001; Prananto *et al.*, 2003).

#### Note

1. The three business directories used were [www.small-business-finder.co.uk](http://www.small-business-finder.co.uk), [www.uksmallbusinessdirectory.co.uk](http://www.uksmallbusinessdirectory.co.uk) and [www.yell.com](http://www.yell.com)

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