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Abstract

The wild days of Electronic Commerce appear to be over. The Web has matured to an established, widely accepted medium for business. Literature on Web development and design suggests that best practices have been identified. Large, highly visible companies like Amazon, eBay or Expedia appear to be setting standards in their respective business segments. However, anecdotal evidence suggests that there is a still a high level of divergence on the consumer front end: socially accepted and acknowledged routines have not yet emerged and companies are changing their Web presence regularly. This raises the question, whether online customer front ends will become more similar or more different, whether convergence or divergence will be symptomatic for the further development of the domain. In order to understand the ambiguous situation, we are discussing drivers for either divergence or convergence on different conceptual levels of a commercial Web site. For purpose of illustration we will use examples from a range of industries.

1   Introduction

One of the fundamental changes that information technology has brought to society and the world of business in particular was the emergence of Web based commerce. The development of hardware and software to not only connect all kinds of computers, but also to give easy, affordable and convenient access to the 'space' of interconnected resources to large parts of the population, has lead to a diffusion process of previously unobserved velocity [Schmid 2001]. In the second half of the 1990s, a large number of end consumers for the first time in history had the technology at hand to trigger and

control a wide variety of transactions entirely on their own. Previously, the 'front end' of a business had usually been a human agent working on behalf of the supplier, such as a shop assistant, a cashier, a bank clerk, a sales representative or a call centre agent. In contrast, with Web based systems, the customer is encountering technology herself and gets in immediate contact with parts of the supplier's IT system. Of course, there have been predecessors of such an empowerment of the customer: cash dispensers, vending machines and proprietary online services are slightly earlier examples of self service technologies [Meuter et al. 2000]. However, they are much more limited in functionality, scope of application and/ or customer acceptance. Also, they are often kept in the control sphere of the supplier, whereas on the Web, the context of use is largely left to the customer's choice and the supplier's control over interaction processes is more limited [Klein; Totz 2003].

This novelty of the customer being highly involved into the interaction with the supplier's technical artefacts is one of the reasons why the beginning of Web based electronic commerce was characterised by a high degree of uncertainty and unsteadiness: The common perception that with the internet, everything changes [Markus 2000], that new rules apply [Kelly 1997] and that we step over into a 'New' or 'Digital Economy' [Tapscott 1995] has led many to discard principles which before had proven to be valid and useful. As a result, in creating the new 'front ends' to the customer, many started from scratch instead of transferring knowledge from other domains: established user interface guidelines were ignored as much as principles of software engineering and basic economic truths. This development was further reinforced by the perceived time pressure which did not allow for systematic design approaches and instead drew many actors into the industry who lacked education as much as experience. Following the frequently voiced 'the winner takes it all' hypothesis [Adamic; Hubermann 1999], being first became much more important than being best and added to the arbitrariness in practices. Finally, confusion existed with respect to the appropriate interpretation of the novelty: Is it inherently technical, social or commercial? Does it fall into the domain of marketing or rather that of IT? Is it persistent, reliable, legitimate and secure? What are appropriate means of use and promising target groups? Which genres fit the Web – information, entertainment, advertising, transaction [Palmer; Griffith 1998]?

As much as this uncertainty necessitated a process of sense-making, the general conditions were in favour of experimentation: entry barriers in e-commerce are low and thus, many different ideas could be tried in practice even before they had conceptually matured. The low cost for the required infrastructure could easily be obtained from the over-enthusiastic risk capital market of the time and entrepreneurial spirit encouraged many to test out new approaches [Keen 2004, p. 18]. Also the great ease with which changes can be applied to Web interfaces facilitated experimentation. For quite a number of Web sites, periodical design changes and 'relaunches' even became a guiding principle.

Experimentation leads to both, variation over time and variety at any given moment in time. This paper discusses if and how the degree of concurrent variety among commercial Web sites will change over time. In other words, we investigate whether the new customer front ends will become more similar or more different, whether convergence or divergence will be symptomatic for the further development of the domain.

The paper is structured as follows: We first explore the phenomenon of diversity in Web commerce, try to distinguish several conceptual layers in which diversity can be found, and provide some anecdotal evidence. We then turn to the Technology Life Cycle, a descriptive model outlining common patterns in product class innovation, including the emergence of a 'dominant design' after an initial phase of technological ferment. The question is put forward whether there is sufficient reason to hypothesize the occurrence of a dominant design – or at least an increased level of homogeneity – also in Web based

commerce. We approach this question on a theoretical level, discussing various drivers of convergence as well as divergence and their likelihood to be applicable in the domain. We predict that on different conceptual levels both convergence and divergence will play a role. However, other than the early diversity observed in Web commerce, differences will not occur due to uncertainty and experimentation, but because they are the result of deliberate decisions related to design aspects where differentiation strategies appear to be more appropriate than imitative behaviour.

2   Diversity In Web Commerce

The Internet and specifically the Web has been heralded as a medium of empowerment for both individuals and organisations. Increasingly powerful technology has been put into the hands of users and developers likewise who can design and publish Web sites in line with their individual preferences and resources. Consequently, diversity in Web commerce can be found in a wide range of areas ranging from fonts and colours of text to the business model pursued. In order to provide reference and orientation, we distinguish between five main levels of design and differentiation: role, scope, process structure, interface patterns and graphical design of a Web site. For each level, we will outline some examples which illustrate that 12 years after the first commercial application of the Web, variety in practices is still substantial.

The most fundamental decisions refer to the question of what the **role** of the Web site should be in the larger context of business activities. The range of feasible options is reflected by several popular taxonomies, classifying e.g. into promotion, provision and processing [Ho 1997], information, interaction, community and transaction [Klein; Szyperski 1998], or content, commerce and community. Even approaches of close competitors are fundamentally different: while Esprit has put a fully featured e-shop on the Web, benetton.com rather resembles a virtual fashion show presenting the latest collection, but missing any functionality to browse a product catalogue or place an order. In grocery retailing, the role of Web sites ranges from online replica of printed advertising material (e.g. www.aldi-nord.de) to feature-rich electronic order and customer relationship systems which go far beyond the possibilities of physical shopping (e.g. www.tesco.com). Strongly intertwined with the intended role of a Web site is the chosen multi-channel strategy. Also in this regard, approaches are diverse and sometimes seem to be contradictory. Whereas many traditional travel agents started their own Web sites in order not to miss out new opportunities, former pure players like ebookers.com and Travel Overland are nowadays operating physical outlets which aim to benefit from their well established brand names.

The **scope** of Web commerce is reflected by choices like geographical reach, target group and product assortment. The internet has been said to sweep away many prior limitations: Both, death of distance [Cairncross 1997] and unconfined one-to-one relationships [Peppers; Rogers 1996] have been predicted. While these developments are visible and well represented by companies like amazon.com, the very opposite can also be found: Many online shopping opportunities are restricted to country or region and even international sites like alitalia.com often have localized versions which differ in far more than only language. The German department store chain Galeria Kaufhof restricts its online assortment to just a few categories and also within these, only covers parts of its range of products. In contrast, coffee giant Tchibo offers a mixture of household equipment, holiday travel, flowers, financial services, wine and coffee on the Web – a combination that is not only much more extensive than in its physical stores but also rather unusual to the world of retailing.

On the level of **processes**, variety can be observed as well: Where to place the login step within an order procedure? At what point should stock be checked for availability? How to deal with the lost password issue? These are all examples of common decisions that Web designers tend to answer very differently. When booking a journey, some travel Web sites make the user select inbound and outbound flight before the actual price is displayed. Elsewhere, he must first choose among a number of tariffs and only then will learn about connections which still have capacity available in the related booking class. Other sites combine both issues in a single step, often resulting in an overwhelming number of travel options. Again we conclude that uncertainty about what works best has lead to a variety of fundamentally different approaches.

Interface patterns refer to common and recurrent problems in designing the user interface like navigation, entering of data, highlighting interactive elements etc. [cf. Lyardet et al. 1999]. One frequent pattern in user interaction is the specification of a date, e.g. the departure date in a travel booking process or the date of birth in a registration form. Also here, various solutions can be found: full text entry, clusters of two or three combo boxes, combination of text field and combo box, graphical presentation of a calendar to pick a date from etc. The question of where to place the menu bar of a Web site has been subject to debate among usability experts [Schwartz 1998, Nielsen 1999]. In comparing the sites of Compaq, Dell, IBM and Hewlett-Packard we find that they all put it into a different edge.

The lowest level of our hierarchy, **graphical design**, encompasses design decisions which refer to aesthetical appearance of a site rather than have an influence on its functionality. In this area, the diversity of the Web appears so obvious that we turn down giving examples.

The five levels of Web site diversity are summarised in table 1. Recapitulating our observations so far, one can identify two themes: The first is discontinuity, the fact that Web commerce constitutes something fundamentally new – not from a mere technological perspective, but with respect to its impact on established socio-economic structures and practices. The second theme can be entitled 'sense making and experimentation' and is reflected by the extensive efforts of actors to test out what variants of application work best. So far, we have only outlined examples from the suppliers' side (i.e. the companies launching Web sites for commercial purposes). However, processes of sense-making also take place when consumers are exploring the advantages and disadvantages of the new 'front ends' by trying them out and exchanging experiences.

Table 1: *Levels Of Web Site Diversity*

Level	Questions	Examples
Role	How does the Web site contribute to the business objective? What is its function in the overall strategy?	a) *Esprit*: E-Shop *Benetton*: Virtual Fashion Show b) *Aldi*: Online Advertising *Tesco*: eCRM System c) *Conventional Travel Agent*: Web site supplements outlet *ebookers, Travel Overland*: Outlet supplements Web site
Scope	Which parts of the target market does the Web site address? What products and services are offered to whom?	a) *Amazon*: Global reach *Corner shop*: Limited reach b) *Galeria Kaufhof*: Select categories; subset of offline assortment *Tchibo*: Diverse categories; superset of offline assortment
Process	How are user interactions structured? In what sequence do inputs and outputs occur?	a) *Online Shops*: Login procedure b) *Online Shops*: Availability check c) *Online Flight Booking*: Sequence of schedule and tariffs
Interface patterns	How have common interface design issues been addressed? What graphical and functional elements are used in order to support user interaction?	a) *Travel Booking*: Specification of a date b) *Menu bars*: Position on the pages c) *Lost password*: Mechanism to verify user's identity
Graphical design	What is the aesthetical appearance of the site? What does it look like?	Different colours, fonts, symbols, images, graphical elements, wording, overall styling etc.

3   The Technology Cycle

Both, discontinuity and sense making/ experimentation, are key elements of the technology life cycle model. Building on earlier work by Abernathy and Utterback [Abernathy 1978, Abernathy; Utterback 1978] Tushman and Anderson [Tushman; Anderson 1986, Anderson; Tushman 1990, Tushman; Rosenkopf 1992] argue that the development of a product class follows a cyclical pattern involving four components (figure 1): 'Technological discontinuities' trigger off eras of ferment, which are characterised by substantial uncertainty, experimentation on the side of both suppliers and consumers, large product variety as well as frequent design changes. Only after a while, mediated by forces like sense making, growing experience, technical superiority of single design options, market processes or even chance events, will a 'dominant design' emerge. A dominant design is a synthesis of product characteristics which dominate the market and are widely believed to be critical. Even though products continue to be different in less relevant aspects, the dominant design sets product-class standards. It acts as a 'benchmark' [Abernathy 1978] or 'guidepost' [Sahal 1981] for consumers and producers alike; indicating what attributes a product must possess in order to achieve market success. By doing so, a dominant design significantly reduces market uncertainty as well

as diversity. Its emergence has a strong impact on the industry in that it marks the beginning of an 'era of incremental change' in which consumer preferences are well known, products are rather similar, variation is small and competition focuses on price rather than product.
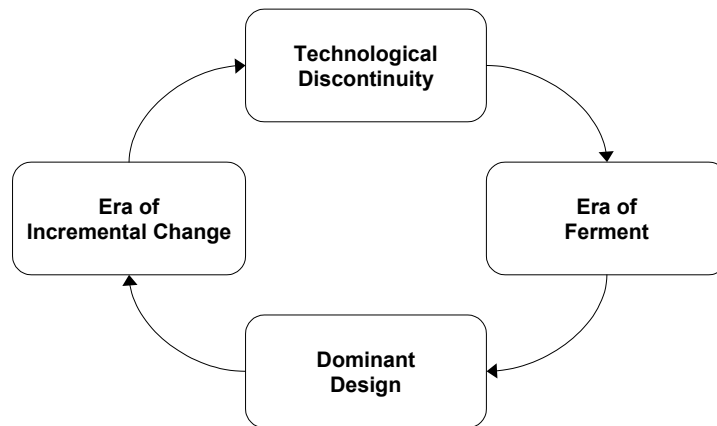

Figure 1: *Technology Life Cycle*

The model has been applied to a large number of product classes and its fit has been argued in areas as diverse as e.g. cars, airplanes, hard disk drives, credit cards, refrigerators, typewriters, spreadsheet software, microprocessors and mining explosives [Cook 1989, Henderson; Clark 1990, Utterback; Suarez 1993, Lee et al. 1995, Suarez; Utterback 1995, Smit; Pistorius 1998]. From the obvious similarity of its first two elements to the current situation in Web based commerce, three sets of questions evolve:

1. Does the model also fit to commercial Web sites, i.e. will convergence take place also in this domain, potentially even leading into the emergence of a dominant design?

2. On which conceptual levels and in what aspects is such a convergence likely to occur? What are the attributes and dimensions that characterise a potential dominant design exemplar in a particular class of Web sites?

3. How long will the era of ferment last? When will a potential dominant design emerge?

Obviously, the last two issues are contingent on a positive evaluation of the first question. Moreover, an empirical test of the where, when and how of Web site convergence can only take place after the first question has been conceptually refined: An increase in similarity can only be observed when one knows where to look for it. This, in turn, requires the observer to have an insight into the forces at work.

Unfortunately, the drivers leading to a dominant design have only been insufficiently studied and an established theory of how and why it will occur does not yet exist. So far, consumer preferences, product complexity, compatibility requirements, learning curve effects, normative isomorphism, network externalities and imitative behaviour [Tushman; Rosenkopf 1992, Lee et al. 1995, DiMaggio; Powell 1983] have all been named as potentially relevant and it seems that their relative influence is contingent on the particular product category. Furthermore, there is considerable confusion about how to conceptualize instances of a dominant design. While the literature on the topic addresses the common theme of design convergence, researches have taken rather different

perspectives, including the association with a certain model, adherence to a compatibility standard, a set of features, a user interface approach or minimum performance characteristics [Abernathy 1978, Utterback; Suarez 1993, Suarez; Utterback 1995, Lee et al. 1995, Tushman; Murmann 1998, Christensen; Suarez; Utterback 1998]. Finally, insufficient knowledge exists about preconditions for the application of the model. Its fit has primarily been shown for select classes of mass produced technical goods. However, neither its universal applicability within this domain nor its restriction to manufacturing industries have been proven so far. After all, the model is only descriptive and neither predicts whether and when a dominant design will occur nor which dimensions of the product class will be affected.

The conceptual flaws of the Technology Life Cycle model limit its empirical validation. Particularly, it is impossible to identify the parameters of Web sites in which convergence is likely to take place unless well-founded assumptions about the drivers of such a development exist. Hence, in the remainder of this paper, we focus our analysis on the following questions:

1. What reasons does theory provide to expect that design approaches of competing Web sites will converge or diverge?

2. On what levels of Web site design will drivers of convergence or divergence respectively most likely have an impact?

We will do so by discussing various drivers of convergence as well as divergence and their likelihood to be applicable in the domain.

4 Explaining Convergence And Divergence

In our discussion we are combining three perspectives: from a social and behavioural perspective we will assess the cognitive costs of differentiation, from a strategic perspective we will identify companies' rationales to use the Web as a tool for differentiation, from a (short term) economic perspective we will discuss underlying cost structures for differentiation strategies.

Specifically we will be looking at:

a) user (consumer) needs and preferences,

b) Web site providers' (suppliers') strategies

c) specific properties of the technology at work with a focus on the economics of differentiation.

4.1 Drivers Of Convergence

'Efficiency of use' and 'fit with expectations' play major roles in the quality of a Web site as it is observed by **users**. Both are strongly intertwined: Due to less errors, reduced friction, mental confusion and need for learning, efficiency of use is particularly high when the role, scope, process structure, interface patterns and graphical design of a site meets the user's expectations. Conversely, design options that turn out to be 'best practices' are usually adopted, gain proliferation and thus shape expectations. Two cases can be distinguished: If an objectively superior approach exists, its benefits to users will promote its diffusion and dominance. If, instead, several options are of similar appeal,

familiarity will have a strong impact: Users prefer what they are used to. Routines and practices provide orientation and reduce complexity. Designers try to capture routines or establish new once for a majority of users. Through consecutive user interaction with the resulting design, this feeds back into a growing base of users who are familiar with the particular approach and eventually leads to its dominance. Web sites which are perceived as well designed set expectations and are taken as benchmark for other sites even in different industries or application domains. For example, users who have experienced the 'shopping cart metaphor' on consumer oriented online shops for physical goods may expect such a feature also on a B2B portal for business travel [Voss; Schubert 2004]. This effect is reinforced by what Adamic and Hubermann call 'the winner takes it all': a small number of sites draw the majority of visitors and hence are particularly influential in setting standards and expectations.

The relative importance of these two mechanisms – diffusion of 'objectively' superior designs and proliferation of 'subjective' expectations – and related issues such as 'QWERTY-nomics', 'path dependence' and 'lock-in' have been subject to extensive debate [David 1985, Liebowitz; Margolis 1990, Liebowitz; Margolis 1996]. For our purposes, this can be neglected, since both mechanisms promote convergence (though not necessarily towards the same design approach). After all, whether competing Web sites exhibit a common pattern because it is objectively superior to alternative options or simply because users expect them to do so, is irrelevant to our question. In any case, diversity is associated with high costs for users. Because high costs are not consistent with the 'self service paradigm' in which Web sites should be means for efficient information and transaction, one should expect that convergence is likely to evolve. This argument carries more weight in mass markets than in specialized niches which address experienced users. Against a mainstream trend towards increasing individualization and ever more options for choice, Schwartz [2004] argues quite forcefully in favour of simplicity and less choice as being advantageous for customers.

In the domain of **corporate strategy**, a potential driver for convergence can be seen in the ease of imitation: 'appropriability', the ability of an innovator to capture the rent associated with her innovation [Teece 1988], is very low for almost all aspects of a Web site: practices of competitors can easily be studied and also changes become immediately visible. In most cases, it is not only possible for companies to mimic the design decisions of others, it is also much cheaper: the cost of 'reverse engineering' and imitating an allegedly effective Web site is significantly lower than testing out new approaches. Especially under situations of uncertainty, organisations tend to copy similar organisations which they consider to be more legitimate or successful [DiMaggio; Powell 1983]. Tingling and Parent have recently shown that the influences of such 'mimetic isomorphism' can be very strong also in technology choice decisions and that it can even transcend rational judgment [Tingling; Parent 2002]. A qualified rebuttal against the argument of convergence due to low appropriability on the Web is the reference to 'e-commerce patents' eventually protecting the imitation of artefacts such as virtual shopping carts, pricing models and user interface components: A heated debate has circled around legal protection of design approaches and business practices on the internet [O'Reilly 2000] and legislation is following different approaches in Europe and the US. We tend to argue that until today, and apart from the most spectacular cases, the impact of internet patents seems to be low. One may even bring forward the argument that the call for more rigorous protection mechanisms reflects how much imitation on the Web indeed is an issue. With respect to the role and scope of the Web, a small number of multi channel strategies [Steinfield et al. 2002] and business models (or genre) have been identified. In some markets, one or two models, such as the online travel supermarket á la Expedia or Travelocity in the US, appear to prevail and prompt other players to mimic those models [Klein 2002].

With respect to **technology** supply, convergence is also driven by what has recently be reassessed under the heading of 'commoditization of IT' [Carr 2003]: With growing maturity of the IT (respectively e-commerce) industry, an increasing number of effective and proven solutions become readily available on the market. Already today, Web site providers frequently rely on software packages such as electronic shop templates or online booking engines. Acquisition of such standardised products is usuaally much cheaper than in-house development. Also, companies can profit from the wealth of experience and knowledge about appropriate design decisions that has been embedded into these ready made solutions. However, because those software packages are available to everybody, a situation evolves in which business rivals rely on the same underlying infrastructure, and hence the scope for differentiation becomes much narrower. The market for Internet related software has seen a drastic consolidation and concentration over the past years. Moreover, the highly decentralized structure of the Internet has led to multiple forms of abuse and even criminal behaviour attacking the basic principles of secure communication and information exchange, in particular hackers of all sorts and spam. A possible response might be increasing standardization, regulation and organisational measures, which could lead to increasing convergence.

4.2   *Drivers Of Divergence*

In contrast to the reasons for convergence, many arguments for prevailing divergence can be found. The drivers of divergence can even be presented in a symmetric way: perceived quality by users, competitive behaviour of site owners and technology supply.

In modern societies, ongoing trends towards individualization lead to an increasing diversity in **user preferences**. This is likely to concern also the five levels of our design hierarchy. Commitments and promises to 'treat customers individually' and 'offer a personal service', as they are frequently voiced in advertisements, will even raise customers' expectations to find a Web site that uncompromisingly satisfies their individual needs. At the same time, users are not only becoming more different in their preferences and more demanding regarding their fulfilment, they are also becoming more unsteady and unpredictable. 'Variety seeking' is a frequent phenomenon in consumer buying behaviour [Kahn; Kalwani; Morrison 1986] and it challenges companies' efforts to establish stable products, practices and relationships. There is a number of approaches how these issues can be addressed on the Web. Often, providers try to target a wide range of different customer segments by a single Web presence. The particular characteristics of the Web make it far more easy to let the user choose what he wants: loads of content can be presented for the customers to pick from. Also, interfaces, processes and even assortments can be customized by the user. Personalization or individualization is perceived as a strategy to make computer-mediated communication acceptable for end users [Schubert; Ginzburg 2000] and many major Web sites today offer those features. In fact, this is another aspect in which a widely adopted 'best practice' (and thus convergence) seems to emerge. However, there are two other reactions to diverse and varying preferences, which constitute a contrary development.

First, companies maintain various Web sites in order to address different needs, preferences and tastes. The German Otto corporation for example, controls at least five major travel Web sites (Flug.de, Otto-Reisen, Travelocity Europe, Travel Overland, Travelchannel) which all have their particular layout, interface patterns, process, scope and even role. Similarly, T-Online Germany in 2003 offered both 'T-Online Travel' and 'T-Online Reisen' as part of its consumer portal – two sites which substantially differed in look & feel but had the same purpose of selling travel products online.

Second, it can also be observed that many Web sites change frequently. In longitudinal observation of travel Web sites we found that most sites apply a major design adjustment at least once a year. This is not restricted to the graphical design, but often also involves interface patterns, process structure and in some cases also scope and role of the site.

On the level of **competitive strategy**, companies often choose a differentiation approach. Decisions to act deliberately different from competitors may naturally also affect the role and scope of a Web site. Moreover, companies may perceive the Web site itself as a good opportunity to differentiate. Changes are easy to enact and the moves of the competition can be closely monitored and quickly addressed by countermoves. Hence, diversity in Web sites may reflect both the result and the means of strategic differentiation.

Exploiting differences in needs and preferences in order to price discriminate is another practice that falls into the domain of corporate strategy and leads to divergence. For example, given that expectations among expert users (e.g. frequent flyers in the airline examples) and lay users vary significantly, the Web interface can be used to address these two segments separately. Moreover, it can be argued that differences in interface patterns and interaction processes are effective means of creating switching costs. If the look and feel of competing Web sites varies considerably, efforts to compare suppliers become large. Again, from the example of online travel booking we can conclude that even though the 'competitor is only a mouse click away', difficulties in comparing offers severely limits the efficiency of electronic markets [Öörni 2003, Öörni; Klein 2003].

The variety and complexity of combinations of **technology** and business ideas (captured in the notion of the business model) is so large that experimentation appears to be a proper response in order to build 'requisite variety' [Ashby 1974]. Low customization costs combined with a profound uncertainty about customers' preferences regarding navigational and process structures make it quite easy to justify regular changes. Moreover, the Web has been heralded as a medium which empowers users to design what they want and it provides almost unrestricted opportunities to experiment and change.

Initially most companies built their own Web sites or contracted small companies (Web agencies). With the fast rising complexity of Web offerings and the dot.com crash, a shake-out has happened in this segment of the software market and has led to a concentration process. Nevertheless, current software architectures allow for a high degree of modularization and hence differentiation at low cost.

5   Discussion And Conclusions

Our discussion of drivers is summarized in table 2. We have identified compelling arguments for both, convergence and divergence, trends. As the causes for both are spread across a wide range of - interdependent - issues (social/ behavioural, strategic and economic), predictions are very difficult.

Table 2: *Drivers Of Convergence And Divergence*

Level	Drivers of convergence	Drivers of divergence
Role	*Consumer*: expectations are formed on the Web or transferred from the tradtional offline sphere *Supplier*: low appropriability; Imitation is less risky and costly; normative isomorphism *Technology*: ---	*Consumer*: diverse preferences and needs; variety seeking *Supplier*: focus on particular customer segments; differences result from or are means of a differentiation strategy; price discrimination *Technology*: ---
Scope	*Consumer*: expectations are formed on the Web or transferred from the tradtional offline sphere *Supplier*: low appropriability; imitation is less risky / normative isomorphism *Technology*: ---	*Consumer*: diverse preferences and needs; variety seeking *Supplier*: focus on particular customer segments; differences result from or are means of a differentiation strategy; price discrimination *Technology*: Customizing costs are low, Web sites can be developed 'fully loaded' and customers can select and focus
Process	*Consumer*: expectations shaped by other user interfaces; efficiency of use; preference for simplicity and limited choice; superior approaches *Supplier*: low appropriability; imitation is cheaper and less risky; shared assumptions and beliefs in the design community *Technology*: commoditization of IT; application of off-the-shelf software	*Consumer*: diverse preferences and needs; variety seeking *Supplier*: focus on particular customer segments; differences are means of a differentiation strategy; price discrimination; switching barriers *Technology*: some powerful of-the-shelf software allows for customization also on the level of processes
Interface patterns	*Consumer*: expectations shaped by other user interfaces; efficiency of use; preference for simplicity and limited choice; superior approaches *Supplier*: low appropriability; imitation is cheaper and less risky; shared assumptions and beliefs in the design community *Technology*: commoditization of IT; application of off-the-shelf software; customization not supported or not made use of	*Consumer*: diverse preferences and needs, different forms of cognitive socialization; variety seeking *Supplier*: differences are means of a differentiation strategy; switching barriers *Technology*: customization of interface patterns supported by many of-the-shelf products
Graphical design	*Consumer*: --- *Supplier*: imitation in order to mimic competitor's brand image or to meet current fashion; shared assumptions and beliefs in the design community *Technology*: commoditization of IT; application of off-the-shelf software; customization not supported or not made use of	*Consumer*: expectations shaped by individual brand image and corporate design; diverse preferences; variety seeking *Supplier*: differences are means of a differentiation strategy; switching barriers *Technology*: customization of graphical design is easy to achieve even with simple of-the-shelf software

In order to get a better sense of the actual development, we suggest a research agenda which combines different elements:

- More **behavioural and social research** is needed in order to further our understanding of customers' online behaviour and in particular to identify the emergence and transformation of routines which are used in or applied to an online environment.

- A combination of Web assessment and **strategy** research can be used to capture companies' online strategies. The data collection needs to be complemented by further conceptual work about contingencies (within and across industry segments) in order to explain under which conditions and for what purposes companies opt for a differentiation strategy and when they opt to follow – or even set – standards.

- Empirical data need to be collected on the impact of **technology** on the economics of differentiation. On a micro level, this should be done in line with the identified areas (with focus on design issues and processes) within restricted application domains. Even if the findings are inconclusive for now, they will provide much appreciated input for future comparative static or even longitudinal studies. On a **macro level** studies in line with Adamic and Hubermann's work [1999] are needed to gain insights into structural shifts in the way the Web is used.

Our paper addressed the ambiguous trends in Web site design and has identified drivers for convergence as well as for divergence. Motivated by similarities to the technology cycle model, we tried to find explanations for the existing trends and to develop hypothesis which reflect expectations about changes in the environment and expected impact.

We regard this paper as a first step to develop an empirical research design in order to test the applicability of the technology cycle model. For now, the challenge appears to be in finding a balance between addressing customer's needs for familiarity and maintaining differentiation potentials.

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