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The impact of culture on mobile phone purchasing: A comparison between Thai and British consumers

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THE ICT CONVERGENCE DISCOURSE IN THE INFORMATION SYSTEMS LITERATURE – A SECOND-ORDER OBSERVATION

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Abstract

The idea of ICT Convergence is used by many practitioners and observers - such as economists, politicians, journalists, and academics - as an important descriptor for technological change. However, a review of previous work in this field suggests that, despite more than 30 years of research on ICT Convergence, the theoretical basis of the concept of convergence is still under-researched. In particular in the IS literature, the concept has been either relegated to the sidelines or taken for granted without further reflection. Therefore, a systematic analysis of the idea of ICT Convergence from an IS perspective is needed.

This paper aims to explore how the discourse of convergence is being shaped in the IS literature. In order to address this question, 317 articles published in ten leading IS journals from 1998 to 2008 have been examined. This study has been built around a Grounded Theory approach informed by Niklas Luhmann's Theory of Distinction.

The findings show that convergence cannot be viewed as a single concept. Five archetypes of "convergence communication" are identified, and a conceptualization of ICT Convergence as a double process between alignment and interoperability is suggested. The main limitation of this paper is the focus on leading IS journals.

Keywords: Convergence, Luhmann, Theory of Distinction, Literature Review, Discourse Analysis

1   INTRODUCTION

"Convergence may be the most expensive word in history. It has cost people billions." —David Geffen, co-founder of DreamWorks, 2002

The idea of the convergence of information and communication technologies (ICT Convergence) has been accorded tremendous importance by practitioners and academics alike when describing the process of technological change through digitalisation. Many organizations have used the concept to justify large investments (Lind, 2004) or to solicit funds for entrepreneurial endeavours (Knox, 2003a). But convergence is also seen as one of the driving forces for the development of new information infrastructures and services, and is therefore important to understand from a systems design perspective (Lyytinen & Yoo, 2002).

ICT Convergence is not a new concept. It has been intensively discussed in the academic literature for more than 30 years and has established itself in all major disciplines adjacent to information systems, such as computer science, management, new media, or economics. However, despite the apparent maturity of this research area (Lind, 2004; Farber and Baran, 1977), there is no generally accepted definition of ICT Convergence (Nyström, 2007); instead Appelgren (2004:246) argues that "there seem to be as many definitions of convergence as there are authors discussing the topic".

Furthermore, many authors agree that the idea of convergence lacks a systematic theoretical analysis (see Hacklin, 2007; Nyström, 2007). The diffusion of new converged services like IPTV (the convergence of TV and the Internet) or mobile Internet (the convergence of mobile telephony networks and the Internet) is still very slow in many countries. It is, therefore, crucial to provide a more systematic analysis and more robust theoretical underpinning of this important phenomenon in order to inform future design and regulatory recommendations. This paper argues that because of its close link to technological change, it is highly relevant for the information systems community to engage in this multidisciplinary debate and to offer an own perspective.

Schütz (1962) suggests distinguishing between first-level and second-level constructs. A theory can be built explaining whether an observed phenomenon is a "war dance, a bartender trade, or the reception of a friendly ambassador" (Schütz, 1962 p. 54); or it can be investigated how the observed persons understand the dance. In Luhmann's terms (2002), focusing less on the constructs than on the process of observation, either the dancers themselves (first-order observation) or how the dancers themselves understand the dance (second-order observation) can be observed. As this study is interested in how IS scholars describe convergence, the primary focus is therefore not the phenomenon of convergence itself; but on the perspective of a second-order observer (Luhmann, 2002). Therefore, at this point a definition of ICT Convergence will not be committed to upfront. This definition should instead emerge from second-order observation.

The purpose of this paper is, therefore, to provide a taxonomy based on a systematic second-order analysis of how the idea of convergence has been constructed and used in the IS literature. Based on the taxonomy, this study aims to analyse in particular what constitutes a particular form of convergence communication, namely "ICT Convergence", from an IS perspective.

The organization of this paper is as follows: The literature review provides an overview about the existing literature on ICT Convergence from both first and second-order perspectives. Next, the paper presents its analytical approach based on the work by Niklas Luhmann and gives a brief account on the applied methodology. Finally, five archetypes of convergence communication in the IS literature will be presented and analyzed based on Luhmann's form and differentiation analysis.

The research scope of this paper is limited to the conceptualisation of convergence communication, in particular ICT Convergence communication, in ten leading IS journals and therefore disregards lower-ranked journals, conference papers and books. However, an initial review of other related IS journals and conference papers has not indicated any significant differences to the results presented in this paper.

2 LITERATURE REVIEW

The following literature review draws the distinction between first-order and second-order research on ICT Convergence. The first-order research deals directly with the underlying phenomenon of convergence, its drivers and consequences. The second-order research, on the other hand, deals with how the idea of convergence has been constructed by the observers of the phenomenon.

2.1 First-order analysis of ICT Convergence

ICT Convergence has been studied from many different perspectives and may be seen as a truly multidisciplinary research topic. This review focuses on the key works in the fields of management, computer science, new media, and information systems.

Computer Science Perspective: The meaning of ICT Convergence, in the context of digitalization, has already been envisioned by H. E. Vaughan of Bell Labs in 1959 as integrated communications that can provide flexibility for new services. There are manifold debates on convergence from the perspective of computer science. Messerschmidt (1996) identifies nine key debates related to convergence in the Computer Science literature: (1) best effort versus Quality of Service (QoS), (2) scalability, (3) terminal and network coordination, (4) connection versus wireless, (5) control architecture, (6) interconnection versus interoperability, (7) embedded computing versus general-purpose computing, (8) heterogeneity, and (9) architecture and complexity management. In particular, the design issues pertaining to increased conflicts or "tussles" through convergence and how to better control networks are of primary concern (see, e.g., Clark et al., 2005).

Management Perspective: The term "technical convergence" was coined four years later in 1963 by Rosenberg, who studied the American machine tool industry of the 18th century. According to Hacklin (2007), the key debates revolve around how an organization should respond to convergence, which may be viewed in the larger context of how organizations respond to innovations or market disruptions not originated by them. The debates have proceeded on two levels of analysis: at the firm level and at the industry-level. The management literature, drawing upon Rosenberg, began to incorporate the concept of convergence into the study of strategic management, building analytical tools and offering recommendations on how companies should react to technical convergence (Pennings & Puranam, 2001). Researchers also debate how to conceptualise convergence itself. Is it an endpoint or a process? If it is a process, how can this process be described? However, only a few scholars have attempted to describe convergence and craft a theory. One of the first serious attempts to do so from a management perspective was undertaken by Greenstein and Khanna (1997)—who distinguish between convergence of substitutes, which entails one domain competing with another, and complementary convergence, which entails two different fields coming together. Stieglitz (2002) refines the model by introducing a second dimension, that of product orientation versus technology orientation. However, each of these conceptualisations focuses only on industry-convergence, taking technological aspects for granted. The latest major work on convergence from a management perspective was conducted by Hacklin (2007), who interprets convergence as a species of technological change. He suggests analysing it as a process that originates in convergences of knowledge, technology, and applications, leading eventually to industrial convergence.

New Media Perspective: Convergence is one of the many terms proposed to describe technological change through digitalisation in the media literature. Other competing terms offered in the 1970s include "compunications" (A. Oettinger) and "telematique" (Nora & Minc). However, "convergence" eventually triumphed as the dominant label for this form of technological change, and became the term to be deployed in both the management literature and the popular media. It was further popularised by Nicolas Negroponte's famous figure of three overlapping circles, a highly static conceptualization that assumes that convergence is an end-stage. Ithiel de Sola Pool's book *Technologies of Freedom* (1983) uses the term to describe the convergence of different modes of communication. Henry Jenkins (2001) built upon de Sola Pool's findings and systematises the concept of convergence by splitting it into five

different processes: namely, technical and economic convergence, which together lead to global, cultural, and organic convergence. Jenkins (2006) argues in particular for a wider understanding of convergence and coined the term "convergence culture".

IS Perspective: Only a few articles in the core IS literature deal with the concept of convergence explicitly—all, without exception, on mobile computing and information infrastructures. Lyytinen and Yoo (2002) briefly address convergence in their discussion of the drivers of a nomadic information environment. They see convergence, mobility, and mass scale as driving development for both information infrastructures and services. Convergence is defined as the "digital processing of all forms of data […] across different carriers […] with multiple devices…." (p. 379). Finally, they note that open standards are essential to convergence. Nielsen (2004) sees convergence as a "process bringing together different and heterogeneous actors as well as markets and technologies, a process not only bringing synergies but also challenges." He argues that in particular conflicting interests might emerge from these convergence processes.

Jansen and Nielsen (2005) investigate the convergence of UMTS and WiFi infrastructures in Norway. They suggest conceptualising convergence as a form of co-evolution, pointing out that the convergence of these two infrastructures is by no means inevitable. Tilson (2008) addresses several convergence instances in the mobile and television industry. He uses actor-network-theory to "explain convergence, the explosion in the number of interfaces requiring standardization, and other industry and standardization changes observed in the case studies" (p. 17).

2.2 Second-order analysis

Several studies over the last five years discuss convergence from a second-order perspective, i.e. analyzing or reflecting on the idea of convergence instead of describing the underlying phenomenon. Knox (2003b) analyses the idea of convergence from an anthropological perspective, considering how it has been mobilised in the development of new media in Manchester. She points out that convergence is used by both observers of new media (economists, academics, politicians, civil servants) and its practitioners (Knox, 2003a). Further, Knox argues that the articulation of the term often manifests a "calculated performance" in which *the lack of experience by these companies is self-replicated in as much as they are required to seek out novelty and new ways of working"* (p. 47). Furthermore, she suggests seeing convergence not only as a singular description of a process but rather as a descriptor of change "which has gained its predominance from the fact that it cannot be pinned down to a single process, a single model, from the fact therefore of its own reproduction" (p. 120).

In a study of the usage of the term convergence in published newspaper articles between 1990 and 2004, Lind (2004) finds that the idea of convergence is often used to justify mergers and acquisitions, and also to flag impending change early in the redefinition of a market. In a study of how business and IT managers in the Finnish telecommunications and media sector perceive convergence, Nyström (2007) stresses the need for a better description of what convergence is and what it is not. Hacklin (2007) argues for the importance of a better understanding of how the term is used in the literature.

The main shortcoming of the existing body of second-order literature on ICT Convergence is, with the exception of the work by Knox (2003b) and Nyström (2008), that it has not moved further below the surface to enrich the understanding of the idea of convergence. Since the most prominent meaning of convergence has emerged in information and communication technologies (Hacklin, 2007), it is fruitful to engage in this discussion, particularly in relation to information systems.

2.3 Key findings

The review shows that most first-order observations in various academic disciplines take the concept of ICT Convergence for granted. Furthermore, the IS literature lacks a systematic second-order analysis of ICT Convergence. Finally, there is evidence that the concept has been diluted which makes an analysis of the distinctions of what constitutes convergence and what does not necessary.

Therefore, the expected theoretical contributions of this paper are threefold. First, this research aims to provide an initial second-order taxonomy on convergence from an IS perspective. The paper aims to show that convergence has been used in information systems in several different contexts, but only very superficially in the context of technological change. Second, this paper expects to improve the theoretical understanding of ICT Convergence from an information systems perspective. Third, it aims to contribute second-order observations to the debate on the conceptualization of ICT Convergence and also to push the analysis deeper than previous studies.

3 ANALYTICAL STRATEGIES – THEORIES OF DISTINCTION

One interesting aspect of all previous attempts to investigate the idea of convergence from a second-order perspective (with the exception of Hannah Knox's approach using Callon's analysis of framing and externality) is the lack of an analytical strategy as a guide for data collection and analysis. Andersen (1999) uses the notion of analytical strategies to describe the aspects involved in making an analysis from a constructivist point of departure. By doing so, he intends to emphasize that a second-order observation is not a method to be deployed in order to get closer to the truth about an object. Instead, the social perceptions of objects are to be analyzed.

Niklas Luhmann's General Theory of Social Systems is one of the grand theories in the social sciences (Lee, 2000). Although there are many different ways to access Luhmann, this study has chosen the Spencer-Brownian route to the Theory of Distinction (Andersen, 2003, p. 64). To draw on Spencer Brown's Law of Form (1969), the basis of form analysis is observation, which consists of two components, distinction and indication. Whenever something is observed, a distinction is made between the inner side and the outer side by choosing or "marking" the inner side as the unit of analysis. There is always something left to be "unsaid," which is the residual category (Demetis & Angell, 2007). According to Luhmann, every researcher has to decide how he or she will observe the object of study (Luhmann, 2002). Any choice of distinction is contingent and hence open for criticism. Luhmann (2002) suggests looking instead at how the object draws the distinction between itself and its environment. Thus, this research is interested in how the authors of the texts make their own distinctions on convergence.

The approach applied by this paper uses two types of discursive analytical strategies in the data analysis, both based on the work by Niklas Luhmann: form analysis and a sub-form of systems analysis known as differentiation analysis (Andersen, 2003). Form analysis provides the foundation of the data analysis and focuses on the following question: Which distinction allows the observer to see the environment in terms of convergence, or, more specifically, which is the unmarked side of the difference when communication indicates convergence? Form analysis is not an end in itself, but it leads to the question of how social systems cope with—or, in Luhmann's language, "de-paradoxify"— the paradoxes upon which their communication structure is built (Andersen, 2003: 101). In the analysis of how IS researchers apply the concept of convergence, this paper also applies differentiation analysis to identify distinct forms of "convergence communication". The guiding distinction for this analysis is similarity/difference. This paper uses differentiation analysis to observe the functional differentiation between different types of convergence to build a taxonomy of convergence.

4 METHODOLOGY

The methodology is primarily influenced by the Grounded Theory approach, which has been used successfully in previous studies (Jones, 2004; Orlikowski & Iacono, 2001). This approach to analyzing IS journal papers uses a kind of content analysis in which categories are developed solely on the basis of the findings from the data and not imposed from the outside (Agar, 1980). However, it differs from the traditional content analysis since the categories were not pre-defined but have emerged during the data analysis.

This study follows the Corbin and Strauss (1990) version of Grounded Theory, but differs from their strict approach in two distinct ways. First, the data selection is based on corpus construction (Bauer and Aarts, 2000) instead of theoretical sampling. Second, the focus is not only on the core category but also on the core distinction using Luhmann's Theory of Distinction as additional analytical strategy in the analysis of the findings.

Corpus construction (Bauer & Aarts, 2000) has the advantage of offering a vocabulary that is independent of sampling logic and that overcomes the shortcomings of theoretical sampling, as suggested by Strauss and Corbin (1990), such as multiplication of sampling methods. The goal is to select "incidents" of a phenomenon, not to sample a population (Bauer & Aarts, 2000). Barthes (1967) suggests selecting a data corpus based on relevance, homogeneity, and synchronicity. By keeping the focus on information systems relevance was ensured whereas homogeneity of the corpus was achieved by taking only journal articles into consideration. Finally, synchronicity has been maintained by focusing on journal articles that were published between 1998 and 2008.

This study focuses only on the leading academic IS journals. Ten IS journals (MIS Quarterly, Information Systems Research, Journal of MIS, Journal of the AIS, Information & Organization, European Journal of Information Systems, Journal of Strategic Information Systems, Information Systems Journal, Information & Management, Decision Support Systems) have been drawn upon based on the ranking from Louisiana State University, since it distinguishes among management, practitioners', and "pure" IS journals. The selected journals also appear frequently in the top ten rankings in recent studies (see e.g. Rainer & Miller, 2005 or Peffers & Tang, 2003). The decision to focus on this body of literature and to exclude other journals, conference papers, etc., is driven by relevance and resource constraints. The primary aim here is to see how the highly relevant concept of convergence is treated and used in the mainstream IS journals.

A full text search has been conducted on the term "convergence" using Business Source Premier, Sweetwise, and ScienceDirect. The search has not been limited to "ICT Convergence" to achieve a broad understanding of convergence communication and to increase the variety of the findings. The only exception for the analysis period between 1998 and 2008 is the *Journal of the AIS* which has only been published in 1999. This timeframe has been selected to cover an extended period, but at the same time benefits from the easy data access to conduct a full-text search. For most of the journals, no electronic versions are available before 1998. Based on the search results, a corpus of 341 journal articles has been constructed and imported into the software package Atlas.ti. 24 articles which used the term "convergence" only in the bibliography have been excluded and the final corpus comprised of 317 articles.

The approach of informing Grounded Theory with the Theory of Distinction is new, especially in the IS field, but has already proven valuable in other domains of social sciences (Gibson et al., 2005). Theory of Distinction has been used as an analytical strategy to sharpen the perception of differences in the data analysis (Andersen, 2003). It is consistent with Grounded Theory in several ways. Firstly, both are interested in the emergence of meaning and focus on what has been communicated and how it has been organized. However, they differ in one distinct aspect: traditional Grounded Theory searches for the core category, whereas the Theory of Distinction is concerned with the "guiding distinction" (Gibson et al., 2005).

5. FINDINGS

Each article has been searched for the term "convergence," and the relevant paragraphs have been coded by repeatedly asking what it means in this instance, in what context it is used, and what distinctions are made by the authors of these articles. Based on the context codes, six categories of contexts have been identified in which the authors used convergence. Three contexts are closely related to the research process itself, and three were related to the phenomenon under study.

The findings suggest that the IS community uses the concept of convergence to describe (I) research streams and theoretical concepts coming together; (II) quality criteria in methodology sections; and

(III) the processing of quantitative and qualitative data analysis. The topical contexts can be broadly separated into (IV) decision-making; (V) technological change; and (VI) other contexts.

Table 2 illustrates the different sub-themes and the number of occurrences in the data corpus. One interesting aspect of this data is that convergence in the context of technological change has only 48 occurrences, which account for less than 15% of the articles (total = 317). In the next step, some initial concepts have been identified with their properties and their dimensions, and the data accordingly coded. These insights and the method of constant comparisons have been used to construct a first set of categories. Based on the analysis, the five identified categories or conceptualizations of convergence are: alignment, recombination, optimization, interoperability and correspondence. The category labels are rooted in the data. In the following paragraphs, all five views on convergence identified in the course of the analysis of the data corpus are presented.

Convergence as Alignment: In the IS literature, the concept of alignment is primarily used in the context of decision-making. In the data corpus two sub-forms are identified: one based on building up shared models between social systems and the other one on finalizing the decision-making process. In both cases, a change in both converging elements is anticipated in order to reach some sort of consensus. IT has more of a support role in the form of group or decision-support systems. Both sub-forms have an iterative process understanding of convergence. Convergence as decision-making is intended to increase focus and efficiency whereas convergence as building up shared mental models aims towards incremental change in individual accuracy.

Convergence as Correspondence: Convergence as correspondence focuses on similarities among concepts and highlights correlations or equality between them. It is used in the context of aligning research findings with existing research or in the process of triangulation. The converging elements are not anticipated to change, but are conceptualised in a stable state. Therefore, convergence is not seen as a process but as an end stage. The process is folded into one dimension and is not iterative:

Context	Freq.	%	Freq.	%
I. Research focus			36	11
Interdisciplinary	8	22		
Research Streams	12	33		
Theories	10	28		
Findings	6	17		
II. Quality criteria			37	12
Triangulation	12	32		
Validity	25	68		
III. Data analysis			65	21
Saturation	2	3		
Neural Networks	20	30		
Genetic Algorithms	16	25		
Other Algorithms	27	42		
IV. Decision-making			119	38
Groupwork	52	44		
Alignment	22	18		
Decision-support	8	7		
Agent systems	37	31		
V. Techn. Change			46	14
Infrastructure	9	19		
Network	21	44		
Organisation				
Mobility	10	21		
Web service	6	13		
VI. Other contexts			14	4
Globalisation	11	79		
Activities	2	14		
Telemedicine	1	7		
Total	317	-	317	100

Table 1: Convergence Contexts

Context	Types									
	Interoperability		Recombination		Optimization		Alignment		Correspondence	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Research focus	-	-	11	65	-	-	16	15	9	31
Quality criteria	-	-	-	-	25	18	-	-	12	41
Data analysis	-	-	-	-	65	47	-	-	-	-
Decision-making	-	-	-	-	45	33	74	69	-	-
Techn. Change	27	100	6	35	-	-	13	12	-	-
Other contexts	-	-	-	-	2	1	4	4	8	28
Total Freq. / %	27	9	17	5	137	43	107	34	29	9

Table 2: Convergence Archetypes in Context

Convergence as Recombination: Convergence as recombination deals with the mixing of elements, often resulting in innovation. It is used in the context of bringing together different concepts, for example, in the form of research streams, different functionalities, or media in the context of technological change. This view focuses on the mix and the outcome and does not account for an iterative process. It assumes no change in the converging elements themselves, as observed in the case of alignment, but instead results in the creation of a new element:

> *The industry has experienced the introduction of nearly twenty competing products […] convergence of functionality of hand-held devices, palm devices, small phones, and car communication systems within a short time span of about 2 years. (Ramesh & Tiwana, 1999).*

Convergence as Optimization: Convergence as optimization has been found mainly in the data analysis sections of the articles. An optimization problem is at hand and is analysed in different ways (e.g., genetic algorithms) to achieve a convergence to the optimal solution. This special form of convergence assumes that there is only one element that changes to a (predefined) ideal stage. It has a strong process view, and number of iterations and rate of convergence are important properties.

Convergence as Interoperability: The interoperability view on convergence is mainly found in the context of technological change, mainly in relationship to system integration and the network organization. Both deal with the detailed technical links between two or more elements moving together. While the integration form sees convergence more as a driver for efficiency, the network organizational form points out that it is set up through standards which are again a result of a negotiation or alignment process among players.

6   DATA ANALYSIS AND DISCUSSION

From the findings so far, three points can be highlighted. Firstly, the concept of convergence as technological change is relegated to the sidelines in the leading IS journals. It has a very small number of occurrences and is primarily picked up within the themes of mobility and network organisation. Secondly, convergence can be conceptualized based on the IS literature in five archetypes: convergence as alignment, interoperability, optimization, recombination, and correspondence. Thirdly, convergence communication in the context of technological change has been primarily described through convergence as interoperability and alignment and, on some occasions, through recombination. In the following differentiation analysis, the differences and the linkages among these five categories are investigated, specifically focusing on the idea of ICT Convergence. In the final step, a form analysis is conducted to identify the overall guiding distinction drawn by the authors in the context of technological change which shapes ICT Convergence communication in the IS field.

Figure 1: Forms of Convergence Communication

6.1 Differentiation Analysis of ICT Convergence

If the differences among the five categories are analyzed, it is observed that the categories mainly differ in the relations of the converging elements (see figure 1). The key distinction between alignment and recombination is that alignment is not about "mixing" media or functionalities. Instead, it deals with streamlining existing ideas, interests and opinions, i.e. agreement on standards. At the same time, the main distinction between alignment and interoperability is that interoperability builds detailed technical bridges or gateways among the converging elements, i.e. web services. Correspondence is a special case, assuming that the converging elements are the same, while optimization differs from the
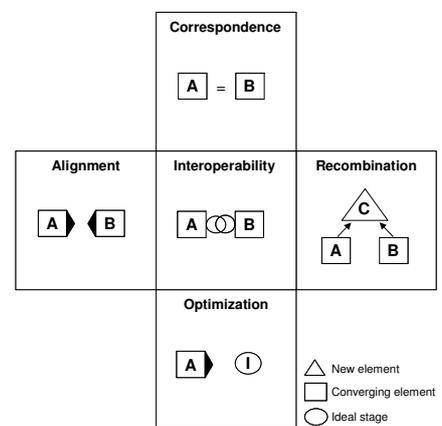
other four conceptualizations because it assumes that there is only one element which moves towards an ideal state or optimum.

In the light of these findings, ICT Convergence is seen as a socio-technical complex (Bauer, 2002) that is observed by a very heterogeneous field of observers. The ICT Convergence complex develops parallel to other established systems that constitute its environment. Any particular observing system might be in focus, depending on the observer and his or her research question, letting the other system move into the background. Based on the observations made so far, the observers in the context of technological change observe convergence as a socio-technical process where both elements mutually constitute each other. A good example of this can be found in a definition quoted by Pawlowski & Robey (2004) from Susan Leigh Star et al. (1997, p. 4):

> *Star et al. defined convergence as 'the double process by which information artifacts and social worlds are fitted to each other and come together...a process of mutual constitution.'*

While the focus of ICT Convergence in IS seems to revolve around this double process of alignment and interoperability, other forms of ICT Convergence communication cannot be ruled out. In fact, from a design perspective it might be very useful to closely examine the other three forms and, in particular, their distinctions.

6.2 Form Analysis of ICT Convergence

What is the guiding distinction that indicates convergence? According to Luhmann (1991, pp. 15-16), there are three ways to make distinctions. Firstly, a distinction can be made without specifying the other side of the distinction (e.g., convergence/no convergence). Secondly, a distinction can be made to restrict the other side of the distinction (e.g., convergence/divergence). Luhmann refers to the first category as objects and to the second category as concepts. Finally, there is a special kind of concept in which a distinction is made by copying it to the inside or outside of the concept itself. Luhmann calls these concepts, which can re-enter themselves, as second-order concepts (he gives an example of government and opposition, where government can itself have a deciding fraction and an opposition). In the following section the forms of all five types of convergence are analyzed to identify the prevailing guiding distinction.

Convergence as alignment: Many authors make the distinction between convergence as a concept and divergence as its counter-concept. While the other side of the distinction of convergence through building shared models is the revelation of biases and conflict, divergence is seen in decision-making as part of the brain-storming phase which seeks creativity and opens up the option space. In the case of the double process of alignment and interoperability, convergence is observed as alignment becoming a second-order concept, which re-enters itself in convergence as interoperability.

Convergence as interoperability: Most authors do not make any explicit distinction except in the context of network organization where the other side of the distinction indicates the traditional form of closed systems.

Convergence as recombination: Similar to interoperability, most authors use it as an object without any clear distinction. Interestingly, recombination has a strong relation to innovation and therefore seems to be closer to the counter-concept of alignment. On the other hand, it leads to new forms which may question the existing beliefs, bringing in diversity and may result in divergence. The other side of the distinction is, in this case, a form of separation, i.e., a concentration on a specific concept, functionality, or medium (see for e.g. the original Blackberry or iPod).

Convergence as optimization: Here, many authors see any divergence from the optimum or ideal stage as main difference. Although this type of convergence communication has not been used explicitly in the context of technological change in the data corpus, some convergence rhetoric is based upon the belief of convergence as an ideal (e.g. discussion on ubiquitous computing). However, from a design perspective it may become problematic if the other side of the distinction is forgotten, namely that there are other alternatives as well. A similar point has been raised by Jansen and Nielsen (2005).

Convergence as correspondence: The other side of the distinction is difference. This view on convergence blends out differences and constructs an artificial sameness between two different elements. It might be helpful from a design perspective to remain sensitive to these differences.

6.3 Discussion

In most cases, the IS researchers in the data corpus use convergence as an object without any clear distinction from its environment. Some other researchers set it explicitly against a counter-concept (this was primarily divergence), and therefore fulfil the criterion of a concept according to Luhmann. Finally, some authors used convergence as alignment as a second-order concept. The first type of distinction is not very helpful; it is a distinction between convergence and everything else. It therefore offers a form, but not a conceptualization of convergence.

So what does making the distinction between convergence and divergence tell us? The unity of the distinction between convergence and divergence could be described as "mutual dependencies between elements." Jansen and Nielsen's (2005) theory of convergence is based on a similar distinction. They call the unity "co-evolution." This indicates that convergence itself is not inevitable and that there might be other trajectories to follow. The first finding from the form analysis is that convergence itself is taken for granted and that the possibility of divergence is mostly ignored or seen as undesirable. Therefore, the relationship between convergence and divergence seems to be asymmetrical.

The second finding is that convergence is not absolute but relative to the observer. For example, ICT Convergence between mobile telephony networks and the internet may be increasing interoperability, but at the same time decreasing alignment between the actors (e.g. increasing conflicting interests). If the distinction between convergence and divergence is more closely analyzed, it can be observed that the same process can be convergence for some observers and divergence for others. The interoperability between different information infrastructures may be convergence from an infrastructure provider but divergence – in terms of increasing option space or choice – for the user. These contradictions in the guiding distinctions between convergence/divergence reveal a paradox. Convergence becomes divergence, divergence becomes convergence – it all depends upon the observer.

According to Luhmann, two possible ways exist to deal with this paradox (Luhmann, 1991, p. 118). The first one is to replace the paradox with a new distinction; the second one is to observe it from a second-order observation and to question why more and more communication in society deals with convergence. One advantage of keeping the convergence/divergence distinction is that it puts emphasis on referentiality; it depends on the observer to determine whether something is convergence or is divergence. If this distinction is kept it is now possible to observe how the paradox unfolds. How does society deal with it? What mechanisms does it establish? Answers to these questions need to be sought to understand better the implications for design and regulatory challenges.

7   CONCLUSION, LIMITATIONS AND FUTURE RESEARCH

The idea of ICT Convergence has existed for more than 30 years and has gained tremendous importance in both practice and academia over these past decades. However, as this paper has shown, convergence has been relegated to the sidelines in IS and has, at best, been taken for granted. The purpose of this paper has been to offer a systematic analysis of how IS researchers see the general idea of convergence and, more specifically, the convergence of ICT.

The analysis of 317 articles from ten of the top IS journals is based on a grounded theory approach informed by Luhmann's Theory of Distinction. From this analysis five types of convergence communications in IS are identified. Besides the contribution to the multidisciplinary literature of second-order analysis of ICT Convergence and to the IS literature in general, this paper aims to contribute to the emerging literature which applies Luhmann's concepts to empirical problems in particular in Information Systems (see, e.g., Kallinikos, 2006; Demetis & Angell, 2007).

Furthermore, this study offers two methodological contributions. Firstly, to the author's knowledge this is the first study in IS, which links Grounded Theory with Luhmann's Theory of Distinction. This approach is very helpful for the analysis because it enables the author to look not only at similarities, but also at differences. Secondly, critics of discourse analysis point out the problem that studies applying this method give only imprecise and implicit suggestions regarding how to carry out discourse analysis (Flick, 2002). Therefore, the author suggests using Luhmann's discursive analytical strategies (Andersen, 2003) as possible guidance for discourse analysis.

Finally, the contribution to practice is to provide for regulatory and design decisions on convergence an alternative path for understanding convergence, which might encourage a less superficial and more thoughtful discussion, changing taken-for-granted assumptions on convergence itself.

The main limitation of this paper is the explicit focus on the main-stream IS journals. The primary limitation of this approach is that it does not take books, conference proceedings, working papers, or articles in other IS-related journals into account. This decision was made to keep the focus primarily on the main body of IS research and because of time constraints. Future research might consider a wider analysis of IS research, including other IS journals, conference papers, or books. Furthermore, an empirical study would be valuable to observe how practitioners attempt to deal with the convergence paradox. Finally, it might be interesting to find out why the concept of convergence has been relegated to the sidelines in the mainstream IS literature.

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