WE’VE GOT 99 PROBLEMS, BUT A PHONE AIN’T ONE
MOBILE ICT AND ACADEMIC AGILITY IN INFORMATION SYSTEMS RESEARCH

Complete Research

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Abstract

The year 2013 celebrated the 40th anniversary since Martin Cooper made the World’s first mobile phone call setting off a slow start to a mobile revolution diffusing a range of mobile information and communication technologies (mobile ICT) within reach of just about anyone. This paper explores how the Information Systems (IS) field has reacted to this significant phenomenon as an example of a measure of our field’s agility in quickly addressing environmental changes to the sociotechnical phenomena constituting our field and incorporating these changes into the mainstream academic discussions. The main assumption is that irrespective of what possible impact and influence the IS field may have on such emerging phenomena, it is an essential part of the field’s justification for existence to provide academically grounded treatments of the most significant sociotechnical phenomena. Given the force, pace and generativity of contemporary ICT development, we assume an increasing need for the IS field to display agility in the way it considers emerging phenomena and either rejects or adopts them as significant for the field. This paper explores the IS field response to mobile ICT as an example of such need for academic agility. A bibliometric study of the basked of eight journals from 2000 to 2010 reveals that the IS field still needs to find ways of responding to developments in a more agile manner.

Keywords: Mobile ICT Research, IS Research, Academic Agility, Bibliometric Study.

1 Introduction

“In theory, there is no difference between theory and practice. In practice, there is.” - Yogi Berra

The Information Systems (IS) field may have many problems, but in the words of New York rap artist Jay-Z, the phone ain’t one! There are currently around 7 billion GSM connections and over 3 billion customers globally as opposed to only a couple of billion internet connections, and the latter are increasing faster through mobile phone access than by any other means. Smartphones and tablets invade private- and working lives whilst resulting in industrial reconfiguration as old industrial giants are facing new ones. In 2008 Nokia became the World's largest camera manufacturer leaving traditional camera brands struggling with Kodak filing for bankruptcy protection in 2012. Microsoft has now bought the handset manufacturing part of the Finnish company and both are united in their struggling against Apple, Samsung, and Google on the global mobile phone market. These are just a small selection of dramatic changes directly related to Mobile information and communication technology.

One of the important challenges for the IS field is to scan the emerging developments where technologies and human practices are innovated and through the academic process of open debate decide upon the relative significance of these phenomena. Within the IS field, the main part of this debate is conducted through journal publications, although books and conference papers also play an important role. Based on the notion of business agility as the ability to quickly and resourcefully adapt
to environmental changes (Mathiassen and Pries-Heje, 2006), we define academic agility as the ability of an academic field to quickly and resourcefully being able to explore environmental changes within its mainstream academic debate. This paper therefore considers the academic agility of the IS field in terms of how the field through journal papers engage in a debate of the relative importance of emerging sociotechnical phenomena. Past research has studied the IS field lack of treatment of a number of issues, for example, health information systems mobile ICT (Lyytinen and Yoo, 2002b), (Chiasson and Davidson, 2004), digital convergence (Herzhoff, 2009), and digital infrastructures (Tilson et al, 2010). The mobile revolution is one of the best examples of digital innovation the past 20 years and is therefore a very good example of a challenge to the academic agility of the IS field. This paper has, therefore, chosen to explicitly follow up on Lyytinen and Yoo’s (2002b) call to action, identifying a lack of IS research within mobile ICT. We wanted to explore how the field has responded to this call and the general technological phenomenon of mobile information and communication technology (mobile ICT). We wanted to understand the agility of the Information Systems field - the speed and strength of the feedback loop from the rapidly evolving global scene of digital innovation to the main outlets of Information Systems research results, and thereby the dominant forum for academic discussions within the field.

There are good examples of research relating significantly to the global diffusion of mobile communications, such as the extensive body of work within the social study of mobile communication (See for example, Katz and Aakhus, 2002; Licoppe, 2004; Ling, 2008). However, whilst these theoretical explorations will be relevant for the study of mobile ICT within the Information Systems field, they will be based on slightly different premises, historical context, theoretical aims, and therefore offer other types of outcome. As examples, these studies largely are not concerned with the materiality of mobile communications and tent to take this aspect for granted while emphasizing the social aspects (Sørensen, 2011).

A bibliometric study retrieved 76 journal articles relating to mobile ICT from the 2001 papers published in the basket of eight IS journals between 2000 and 2010, representing a proportion of 3.8% of the articles. The study also suggests an inverse correlation between the journal impact factor and the propensity of that journal to publish articles on mobile ICT. The study found that the mobile ICT approaches and perspectives largely mirrored those within the existing IS mainstream. Comparing the social and organisational role of mobile ICT, our findings do not seem to point towards the IS field having established an agile and measured response, despite the slight increase in mobile ICT publications over the ten-year period studied. This paper contributes to a lengthy, on-going, debate within the Information Systems field of its status, role and possible contributions to research at large (For example, King and Lyytinen, 2006). Here, a significant body of work has for more than a quarter of a century sought to understand the possible relationships between the field and its practice context and to other academic fields. This paper contributes to the discussion of the academic agility within IS to rapidly engage in a research-based debate of emerging phenomena.

The paper is structured as follows. Section 2 outlines IS research in the IS field and positions this paper within this discussion. Section 3 outlines some of the academic responses so far to the challenge of mobile ICT. Section 4 presents the research approach. Section 5 presents the findings from our bibliometric study. Section 6 both discusses these findings and concludes the paper.

2 IS Studying IS

The Information Systems field has been declared in various crises for a number of years (Benbasat and Zmud, 2003; King and Lyytinen, 2004; Lyytinen and King, 2004; Agarwal and Lucas Jr, 2005). The role of the field has been discussed widely in a number of articles and books (Benbasat and Zmud, 1999; Baskerville and Myers, 2002; Benbasat and Zmud, 2003; King and Lyytinen, 2006; Baskerville and Myers, 2009; Gill, 2009).

Various solutions have been suggested, for example: innovativeness rated higher in academic
Information Systems journals (Lyytinen et al., 2007); academic caring less about the recognition of colleagues (King and Lyytinen, 2004; Lyytinen and King, 2004); turn Information Systems into a proper discipline (Benbasat and Zmud, 2003); and reducing importance of peer-reviewed A-journal papers (Dahlbom, 1996). It as equally been argued that the current state of affairs with digital innovation represents an unique opportunity for our field to contribute (Yoo, 2013).

It could be argued that as a field we are too concerned about academic rigor and less about relevance, as argued within management studies (Mintzberg, 2005; Hambrick, 2007), and indeed Information Systems itself (King and Lyytinen, 2004; Lyytinen and King, 2004). It has within several fields been argued that a close connection between the dynamic phenomena and research is critical (Gibbons, 1994; Tushman and O'Reilly III, 2007; Van De Ven, 2007).

Information Systems is a field characterised both by the need for theoretical insights in constantly shifting phenomena. The HCI field is perhaps even more subjected to such requirements and conference papers have overtaken in importance over journal publications as the primary means of engaging in academic discourse, something Dahlbom (1996) argued a necessity for Information Systems a while ago. With increased digitalisation of a broader set of human activities, and the various forms of convergence across and within digital infrastructures, the speed of digital innovation is not set to slow down as our ability to engage in more effective recombinant innovation will increase (Brynjolfsson and McAfee, 2014, Chapter 5).

While most of this research has focused on the impact from Information Systems research to practitioners engaging in digital innovation and to academics in related fields, this paper focus solely on the feedback loop from the practice of digital innovation and into the Information Systems theoretical debate. This paper is not arguing for full-cycle micro-organisational behaviour research (Chatman and Flynn, 2005), or action research (Mathiassen et al., 2012; Sein et al., 2011), *per se*, but merely for the need for Information Systems to closely follow if not shape, both the information technology artifact and the associated emerging practices.

The paper draws on the concept of business agility denoting the ability to quickly and resourcefully adapt to environmental changes (Mathiassen and Pries-Heje, 2006). Contemporary organisations subjected to changing environmental conditions must display some form of agility in order to thrive (Tallon and Pinsonneault, 2011). Similarly, we define academic agility as the ability of an academic field to quickly and resourcefully being able to explore environmental changes within its mainstream academic debate. Whilst realising that agility both has been used within software engineering as a specific concept characterising specific techniques, while at the same time being a broad concept inviting a multitude of different interpretations, we believe that simply focusing on an academic field’s ability to draw emerging changes in the environment into the mainstream discussion offers us a sufficiently fixed meaning of agility for the purpose of this paper. The paper assumes that part of our research fields' strength increasingly will emerge from its agility in absorbing, relating to, and critiquing, rapidly emerging digital innovations and associated practices. It is not an argument in itself that any new digital innovation immediately ought to result in new categories, conferences, journals, or indeed research fields. At times the newness does not represent a difference that theoretically makes a difference (Bateson, 2000). However, the Information Systems field critically hinges upon technological development within our empirical environment (Lyytinen, 1999). The strength of the field is partly residing in the capacity to rapidly engage in the debate of emerging technological development with theoretical grounding. In order for the Information Systems field to develop it constantly need to move with the technical and technological development of information technology, yet at the same time it needs to accumulate theoretical insights.
3 Mobility Research

This section situates the phenomenon of mobile ICT in neighbouring academic contexts as a way of understanding the diversity of responses to the socio-technical developments. Mobile ICT has been chosen as it constitutes a prototypical case of an emerging socio-technical assemblage with considerable effect on the field of empirical study within IS. This paper is in particular considering a specific class of information technology, broadly categorised by supporting combinations of mobile-, portable-, and pervasive computing (Lyytinen and Yoo, 2002b; Lyytinen and Yoo, 2002a), in short mobile ICT. This technology evokes theoretical notions of movement and interaction across time, space and context (Kakihara and Sørensen, 2001; Arnold, 2003).

A broad range of academic fields and disciplines research issues related to variations in and combinations of space, time, movement and technology. Within the interdisciplinary field of human geography these aspects have for decades formed significant themes of research, see for example (Carlstein, 1983; Gregory and Urry, 1985). More recently the increased interest in issues broadly related to movement and temporality has been labelled “the mobility turn” (Urry, 2007, p.6). The broad social science discussion on mobilities assembles an interesting and rich discourse by growing tentacles that reach deep into a variety of social science issues as illustrated in (Urry, 2007). However, the discussion here tends to avoid any explicit consideration for the material aspects of how social affairs and contemporary information technology are constitutively entangled (Orlikowski, 2007) in everyday life.

Within the social sciences, an emerging and growing community of researchers are engaged in a social study of mobile communications, largely fuelled by the advent of mobile voice calls and SMS connectivity, for example; (Katz and Aakhus, 2002; Ling, 2008). This research field is related to, yet distinct from, the general mobilities research, and has explicitly chosen mobile communications as a focal point of interest. However, characteristic for this highly interesting research is the almost entirely black-boxing of the technology itself. The emphasis is largely on social behaviour under a regime of mobile phone use and not on a broader understanding of the inner socio-technical workings. Ling’s (2008) exposition of rituals in the age of the mobile phone is an interesting sociological analysis that largely takes for granted the technological properties afforded by the mobile phone. Arnold (2003) investigates the phenomenology of technology, using the mobile phone as an example. Arnold refutes the notion of a simple relationship or performance between affordance and purpose, but rather a multi-faceted complex arrangement of contrary performances. Even still, the notion of affordance is not unfolded and merely represented as a black box.

The social science studies of mobile ICT are largely concerned with a single technology, the mobile phone, applied with a general social context (Sørensen, 2011). There is little research on the co-construction of mobile- and ubiquitous information technology and working practices within organisations, as is there only sparse research moving beyond the mobile phone to explore complex assemblages of mobile- and ubiquitous technology. The work by Wajcman and colleagues is a notable exception studying the mobile phone at work (Wajcman et al., 2008; Bittman et al., 2009), and Manning’s (2003; 2008) extensive research into the use of complex technological assemblages within the police force provides another elegant exception that proves the rule.

Considering social science research of flexible working practices facilitated by the use of mobile ICT, then there is here a significant body of research discussing organisational practices without significantly linking it into a deeper understanding of the co-construction of these practices and specific technological choices. Felstead and colleague’s (1998; 2000; 2005) work on shared offices, home working, and mobile working is an excellent example of a highly interesting organisational discourse. Similarly, Sturdy and colleagues (2009) take a close look at management consultancy practices, characterised in terms of boundary spanning and knowledge flows between organisations. Dale and Burrell (2008) study the mutual construction of organisational spaces and practices by relating both to literature from organisational theory, philosophy, social geography and architecture –
yet, information technology is absent.

At the opposite end of an imaginary – and in many ways problematic – socio-technical continuum, we find a broad range of research within the technical sciences engages in the construction of socio-technical visions directly relating to mobilities, for example; wearable computing (Barfield and Caudell, 2001; Mann and Niedzviecki, 2002), ubiquitous computing (Weiser, 1991), novel forms of mobile device interaction (Kjeldskov and Graham, 2003), and pervasive computing (Hansmann et al., 2003; Kourouthanassis and Giaglis, 2008). Characteristic for most of the technical research is an intense interest in creating technological affordances, and only to limited extent exploring these in any social contexts beyond laboratory experiments or other forms of controlled environments (Sørensen, 2011).

The existing research related to mobile ICT, as listed above, simultaneously represent an opportunity for the Information Systems field to both connect and contribute. This does, however, require an initial agile step of relating to the primary phenomenon, exploring it, and discussing it.

4 Approach

4.1 Research framework

The aim of the approach is to examine Information Systems research on mobile ICT applying a number of conceptual frameworks. They are adopted from existing, introspective studies of academic IS from within the field, ensuring that the relevant concepts are used in a critical and well-informed way (Avison and Elliot, 2006). In order to draw on a representative sample of IS knowledge, these indicators are applied to recent papers on mobile ICT from top IS journals. This approach has a rich tradition in IS. Empirical analyses of articles published in one or more IS journals have become an established method of studying IS research in general (Orlikowski and Baroudi, 1991; Farhoomand and Drury, 1999; Orlikowski and Iacono, 2001; Chen and Hirschheim, 2004; Sidorova et al., 2008) as well as specific topics, such as knowledge management (Raub and Rüling, 2001; Schultz and Leidner, 2002), hospital information systems (Chiasson and Davidson, 2004), digital convergence (Herzhoff, 2009), and digital infrastructures (Tilson et al., 2010).

For this paper we have selected three indicators of academic agility within IS in relation to mobile ICT: 1) The first indicator essentially counts the number of published articles discussing mobile ICT across the basked of eight journals; 2) the second indicator is directly based on Lyytinen and Yoo’s (2002b) categorisation and therefore classifies IS papers on mobile ICT based on their eight categories of possible IS research into mobile ICT; and 3) the third indicator is based on the main five perspectives on the ICT artefact identified by Orlikowski and Yates (2001). The following table outlines the three indicators.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Number</td>
<td>The number of published articles discussing mobile ICT</td>
</tr>
<tr>
<td>2 Aspect</td>
<td>A) Individual-level services; B) Individual-level infrastructure; C) Team-level services; D) Team-level infrastructure; E) Organizational-level services F) Organizational-level infrastructure; G) Interorganizational-level services H) Interorganizational-level infrastructure</td>
</tr>
<tr>
<td>3 Artefact</td>
<td>A) Tool view; B) Proxy view; C) Computational view; D) Ensemble view; E) Nominal view</td>
</tr>
</tbody>
</table>

Table 1: The sub-dimensions coded for each of the three indicators.

As the first chosen indicator, the number of articles published on mobile ICT is tallied as a measure of the representation of the extent of research on the phenomenon within the mainstream Information Systems discussion. The second indicator classifies the thematic focus of mobile ICT research in IS. The interest here is to analyse the extent to which the literature takes into account the novel nature of mobile ICT. Lyytinen and Yoo (2002b) argue that IS is uniquely positioned to explore the emerging
socio-technical characteristics of mobile ICT. They distinguish between: a lower *infrastructure* layer that is heterogeneous and decentralized yet based on common interoperability protocols and standards; and, supported by that infrastructure, a higher *service* layer accessible through dynamic mobile devices and mechanisms. They also define four levels, namely individual, team, organizational and interorganizational. This leads to the eight research themes listed in Table 1. This framework specifically relates to the phenomenon and provides a suitable indicator of the IS field’s academic agility with respect to mobile ICT.

The third indicator relates to the presentation and representation of the mobile ICT artefact in IS research classified according to Orlikowski and Iacono’s (2001) categories of the: A) Tool view perceiving ICT as a stable “black box” that behaves in unproblematic and pre-defined ways; B) proxy view understanding ICT through representative, surrogate indicators; C) computational view representing ICT in terms of its computational capabilities; D) ensemble view where ICT is perceived as a complex socio-technical package that includes, shapes and is shaped by social, economic and political elements; and E) nominal view where ICT is evoked in name but not in any distinctive understanding or description. The original study included further two indicators, namely the methodologies applied across the papers on mobile ICT, and the types of knowledge claims made. However, these two indicators were excluded for this paper to comply with the space constraints.

4.2 Bibliometric study

In order to investigate the IS response to mobile ICT, the paper conducts a bibliometric- and content analysis of Information Systems represented by 10 years of publications from the “basket of eight” IS journals based on the three indicators discussed above. Although such journal listings have been criticized (see Willcocks et al., 2008) and by necessity exclude parts of the IS research body, these eight journals fulfil a number of criteria. They enjoy high acceptance among scholars and represent a geographical and topical diversity that has been widely called for (see Gallivan and Benbunan-Finch, 2007). Furthermore, the “basket of eight” includes only journals that are specific to IS, an important requirement for any empirical study focusing on the IS field (Chen and Hirschheim, 2004).

The “basket of eight” consists of four journals mainly based in Europe: 1) European Journal of Information Systems (EJIS); 2) Information Systems Journal (ISJ); 3) Journal of Strategic Information Systems (JSIS); and 4) Journal of Information Technology (JIT). And four journals mainly based in USA: 1) Journal of Management Information Systems (JMIS); 2) Information Systems Research (ISR); 3) Journal of the Association for Information Systems (JAIS); and 4) Management Information Systems Quarterly (MISQ). The corpus consisted of the publications within these eight journals within the period of January 2000 to August 2010 – a timeframe that takes into account the novelty of mobile ICT while allowing for sufficient temporal breadth. The analysis excluded: editorials, book reviews, opinion articles and responses, teaching cases and obituaries. However, research notes were included.

An initial screening of title and abstract, and (where available) keywords of all articles resulted in a first pool of papers. If the paper was deemed to be relevant, i.e., in some capacity exploring the issue of mobile ICT, the full paper was downloaded for further analysis. The thematic criteria for inclusion in the mobile article pool were relatively narrow, given the limited scope of this paper. Articles that specifically mention mobile ICT or related concepts such as ubiquitous computing were included. However, the process excluded papers that discuss wider concepts of relevance to the broader mobility discourse without explicitly referencing mobile ICT. Thus, excluded from the mobile ICT article pool were some (but not all) articles on distributed work (see Sarker and Sahay, 2004; Kotlarsky and Oshri, 2005), virtual teams (see Griffith et al., 2003; Schweitzer and Duxbury, 2010), telecommuting (see Belanger et al., 2001; Iscan and Naktiyok, 2005) and telehealth (see Klecun-Dabrowska and Cornford, 2000). The analysis also exclude meta-research papers discussing or calling for, rather than actually conducting, research on mobile technology (see March et al., 2000; Lytinen and Yoo, 2002b; Sawyer et al., 2003; Mbarika et al., 2005; Wareham et al., 2009; Yoo, 2010).
5 Results

The results section first presents the results from the bibliometric study counting IS articles on mobile ICT, then discusses the findings with respect to the other two indicators based on Lyytinen and Yoo (2002b) and Orlikowski and Yates (2001) respectively.

5.1 How many mobile ICT articles and where published?

Examining the titles, abstracts and keywords of all 2,001 articles published in the “basket of eight” journals between January 2000 and August 2010, revealed that 76 articles specifically discuss mobile ICT, representing a proportion of 3.8% of the initial article pool and with 92.1% of the papers published in the second half of the sampling period, 2005-2010. Table 2 provides an annual breakdown.

ICTs is very small in some journals, 2% or less in MISQ, JMIS, ISR and JAIS. The others - ISJ, JIT, JSIS and EJIS - display substantially higher figures, from 5.7% (ISJ) to 7.5% (EJIS). The 25 articles on mobile ICT published in EJIS alone represent almost a third of the mobile article pool. Table 3 highlights the distribution of mobile ICT research in the eight journals.

Being the focus of 3.8% of the IS literature is not much for a technological phenomenon as global as mobile ICT, especially in a field that is said to be susceptible to contemporary fashions (Baskerville and Myers, 2009). Perhaps journal editors, perceiving a “causal distance” between mobility and core IS themes (Benbasat and Zmud, 2003), consider it best to leave the exploration of the concept to other disciplines. At the same time, the increased interest in mobile ICT since 2005 compared to earlier years may signify a growing recognition of mobile technology; such expansions of scholarly attention usually lead to more mature discussions (Sidorova et al., 2008). This does indicate that the phenomenon is indeed considered relevant for IS but also that the field here is not exercising academic agility in terms of quick and resourceful response to environmental changes.

The difference between two groups of journals can be directly correlated to the journal impact rankings. Many scholars assert that “elite” IS journals with low acceptance rates, who play an important role in setting the IS research agenda, often display thematic and methodological conservatism (see Hirschheim and Klein, 2003; Willcocks et al., 2008; Gill and Bhattacherjee, 2009). Indeed, the four journals with low counts of mobile ICT research enjoy the highest impact levels. Table 3 also provides an overview of the two journal groups and their respective data.

High-ranking academic institutions are inherently conservative, and for good reasons: the replacement of dominant discourses should not be achieved too easily (Lyytinen and King, 2004). But the fact that MISQ and ISR, the IS field’s most highly ranked journals (as measured in 2009), jointly published only 6 articles on mobile technology in over a decade demonstrates a certain disconnection between these IS outlets and “real world” of IS practice.

At the same time, any journal ranking must be taken with a pinch of salt. While the importance of MISQ is uncontested, many European IS journals are regularly misrepresented in rankings that fail to take into account, for instance, the distinctiveness of citation patterns among European researchers (Willcocks et al., 2008). Yet there are commonly accepted differences between American and European IS: the latter is more thematically and methodologically diverse (Avgouros, 2000) and more strongly encourages practitioner involvement in research efforts (Gill and Bhattacherjee, 2009).

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Table 2: Articles on mobile ICT by year published (*=January-August only)

<table>
<thead>
<tr>
<th>Year</th>
<th>Mobile</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>1</td>
<td>165</td>
<td>0.6</td>
</tr>
<tr>
<td>2001</td>
<td>2</td>
<td>147</td>
<td>1.4</td>
</tr>
<tr>
<td>2002</td>
<td>1</td>
<td>151</td>
<td>0.7</td>
</tr>
<tr>
<td>2003</td>
<td>1</td>
<td>151</td>
<td>0.7</td>
</tr>
<tr>
<td>2004</td>
<td>1</td>
<td>163</td>
<td>0.6</td>
</tr>
<tr>
<td>2005</td>
<td>11</td>
<td>185</td>
<td>5.9</td>
</tr>
<tr>
<td>2006</td>
<td>18</td>
<td>210</td>
<td>8.6</td>
</tr>
<tr>
<td>2007</td>
<td>9</td>
<td>239</td>
<td>3.8</td>
</tr>
<tr>
<td>2008</td>
<td>12</td>
<td>226</td>
<td>5.3</td>
</tr>
<tr>
<td>2009</td>
<td>18</td>
<td>229</td>
<td>7.9</td>
</tr>
<tr>
<td>2010*</td>
<td>2</td>
<td>135</td>
<td>1.5</td>
</tr>
<tr>
<td>Total</td>
<td>76</td>
<td>2001</td>
<td>3.8</td>
</tr>
</tbody>
</table>

Table 3: Journals grouped by geographical origin and impact factor. *5-year impact factor from Thomson Reuters Journal Citation Report 2009.

<table>
<thead>
<tr>
<th>Journal</th>
<th>Impact*</th>
<th>Mobile</th>
<th>Total</th>
<th>% Tot.</th>
<th>% Mob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MISQ (USA)</td>
<td>9.2</td>
<td>2</td>
<td>247</td>
<td>0.8</td>
<td>2.6</td>
</tr>
<tr>
<td>ISR (USA)</td>
<td>4.9</td>
<td>4</td>
<td>249</td>
<td>1.6</td>
<td>5.3</td>
</tr>
<tr>
<td>JMIS (USA)</td>
<td>3.2</td>
<td>6</td>
<td>393</td>
<td>1.5</td>
<td>7.9</td>
</tr>
<tr>
<td>JAIS (USA)</td>
<td>3.1</td>
<td>4</td>
<td>201</td>
<td>2</td>
<td>5.3</td>
</tr>
<tr>
<td>Total USA</td>
<td>5.1</td>
<td>16</td>
<td>1090</td>
<td>1.5</td>
<td>21.1</td>
</tr>
<tr>
<td>JIT (EU)</td>
<td>2.7</td>
<td>13</td>
<td>223</td>
<td>5.8</td>
<td>17.1</td>
</tr>
<tr>
<td>JSIS (EU)</td>
<td>2.5</td>
<td>11</td>
<td>161</td>
<td>6.8</td>
<td>14.5</td>
</tr>
<tr>
<td>ISJ (EU)</td>
<td>2.5</td>
<td>11</td>
<td>194</td>
<td>5.7</td>
<td>14.5</td>
</tr>
<tr>
<td>EJIS (EU)</td>
<td>1.5</td>
<td>25</td>
<td>333</td>
<td>7.5</td>
<td>32.9</td>
</tr>
<tr>
<td>Total EU</td>
<td>2.3</td>
<td>60</td>
<td>911</td>
<td>6.6</td>
<td>78.9</td>
</tr>
<tr>
<td>Total</td>
<td>76</td>
<td>2001</td>
<td>3.8</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

Table 4: Distribution of research themes according to classification from Lyttinen and Yoo (2002b)

<table>
<thead>
<tr>
<th>Theme</th>
<th>Articles</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual – Service</td>
<td>33</td>
<td>43.4</td>
</tr>
<tr>
<td>Interorganisational – Infrastructure</td>
<td>12</td>
<td>15.8</td>
</tr>
<tr>
<td>Organisational – Service</td>
<td>12</td>
<td>15.8</td>
</tr>
<tr>
<td>Organisational – Infrastructure</td>
<td>9</td>
<td>11.8</td>
</tr>
<tr>
<td>Team – Service</td>
<td>4</td>
<td>5.3</td>
</tr>
<tr>
<td>Individual - Infrastructure</td>
<td>3</td>
<td>3.9</td>
</tr>
<tr>
<td>Interorganisational – Service</td>
<td>2</td>
<td>2.6</td>
</tr>
<tr>
<td>Team - Infrastructure</td>
<td>1</td>
<td>1.3</td>
</tr>
<tr>
<td>Total</td>
<td>76</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 5: Distribution of IT conceptualisation in research on mobile ICT applying Orlikowski and Iacono’s (2001) framework.

<table>
<thead>
<tr>
<th>ICT Concept</th>
<th>Articles</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proxy View</td>
<td>32</td>
<td>42.1</td>
</tr>
<tr>
<td>Perception</td>
<td>31</td>
<td>40.8</td>
</tr>
<tr>
<td>Diffusion</td>
<td>1</td>
<td>1.4</td>
</tr>
<tr>
<td>Capital</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Ensemble View</td>
<td>29</td>
<td>38.2</td>
</tr>
<tr>
<td>Embedded System</td>
<td>13</td>
<td>17.1</td>
</tr>
<tr>
<td>Production Network</td>
<td>12</td>
<td>15.8</td>
</tr>
<tr>
<td>Development Project</td>
<td>3</td>
<td>3.9</td>
</tr>
<tr>
<td>Structure</td>
<td>1</td>
<td>1.3</td>
</tr>
<tr>
<td>Tool View</td>
<td>8</td>
<td>10.5</td>
</tr>
<tr>
<td>Information Processing</td>
<td>5</td>
<td>6.6</td>
</tr>
<tr>
<td>Productivity</td>
<td>2</td>
<td>2.6</td>
</tr>
<tr>
<td>Social Relations</td>
<td>1</td>
<td>1.3</td>
</tr>
<tr>
<td>Labour Substitution</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Nominal View</td>
<td>5</td>
<td>6.6</td>
</tr>
<tr>
<td>Computational View</td>
<td>2</td>
<td>2.6</td>
</tr>
<tr>
<td>Model</td>
<td>2</td>
<td>2.6</td>
</tr>
<tr>
<td>Algorithm</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>76</td>
<td>100</td>
</tr>
</tbody>
</table>

Twenty Second European Conference on Information Systems, Tel Aviv 2014
Against this backdrop, it is not surprising that the four journals with low impact levels (as of Reuters 2009) and high counts of mobile ICT research are the four European journals, namely EJIS, ISJ, JIT and JSIS. 2 Taken together, they provide 60 of the 76 articles on mobile ICT (78.9%) and account for each of the 7 articles co-authored with one or more IS practitioners. Special issues form a major source of papers on mobile ICT in European journals (e.g., JIT, vol. 24 (2), 2009). These embody specific calls from editorial decision-makers for mobile ICT research, implying a political will to expand the boundaries of IS research.

Political and institutional factors partially explain why mobile ICT research is underrepresented and unevenly distributed in IS research, especially given the perceived state of crisis in the field. King and Lyytinen (2004) describe the phenomenon of “horizontal violence”, in which academics deliberately promote disciplinary narrowness in order to protect their position vis-à-vis newcomers. But as mentioned above, explaining the scarcity of mobile technology research in IS is only one piece in a wider puzzle. The next step consists of examining in detail the subset of 76 articles on mobile ICT.

5.2 Does mobile ICT research within IS deviate from the rest of IS?

The analysis revealed that all eight aspects (indicator 2) based on Lyttinon and Yoo’s (2002b) categorisation are represented in the pool of 76 papers, but in uneven measures (See 4). The study of individual-level services is the focus of 43.4% of the articles. Interorganizational-level infrastructure, organizational-level services and organizational-level infrastructure each account for over 10% of articles. The other four research themes are poorly examined in the mobile ICT literature, with team-level infrastructure the lowest at 1.3%. The substantial majority of 43.4% studying individual-level services corroborates Sørensen’s (2010b) claim that mobility research tends to concentrate on the individual use of mobile ICT, particularly mobile phones, in a general social context. Many papers in this category of the pool engage in conventional survey research examining individual mobile technology adoption (see Venkatesh and Ramesh, 2006; Kim and Han, 2009), though some, for instance Meso et al. (2005), do so in unconventional settings such as developing countries. Research on interorganizational-level mobile infrastructure is relatively well represented, making up 15.8% of the mobile ICT article pool. These studies examine the “highest” level in Lyttinen and Yoo’s (2002b) framework, exploring societal and national ICT policy issues. This is an area that, while not traditionally strong, is gaining attention in the IS field (Sidorova el al., 2008; Tilson et al, 2010), for example; Studies of interfirm relations in converging mobile ecosystems (Basole, 2009), and the development of South Korea’s mobile broadband infrastructures (Yoo et al., 2005).

At a combined 27.6%, the mobile ICT article count for organizational-level services and infrastructure shows that enterprise mobility is receiving attention in the subset of IS mobile technology research. Topics covered in the pool range from corporate wireless security policies (Katos and Adams, 2005) to RFID use in hospitals (Lee and Shim, 2007). Still, the numbers only amount to a quarter of a very limited branch of IS research. More striking are the themes that appear infrequently in the mobile ICT article pool, especially team-level examinations on both the service (5.3%) and the infrastructure layer (1.3%). IS has long been interested in virtual teams and distributed work, but most of this research either predates mobile technology and/or focuses on stationary collaboration tools. This likely explains why – with notable exceptions (see Chudoba et al., 2005) – this theme is largely missing from the mobile ICT article pool. Equally rare in the literature are studies of interorganizational-level services (2.6%) and individual-level infrastructure (3.9%). Overall, analysing the chosen research themes

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2 “European journals” refers here to journals published in Europe and “US journals” to those published in the US. This is a key distinction, because US journals overwhelmingly publish research from US-based researchers, while the majority of articles in European journals are written by scholars based in European institutions (Galliers and Meadows, 2003).
reveals that while the essence of mobile ICT practice is reflected in the literature on mobile technology, several gaps exist. In addition to the ones identified in the previous paragraphs, the overall infrastructure layer is also under-researched compared to the services layer. This supports the verdict, advanced by Tilson et al. (2010), that mobile information infrastructures are becoming increasingly complex and difficult to study and that the IS field in general lacks infrastructure research.

Regarding **indicator 3, the conceptualization of the mobile ICT artefact**, the article pool features two predominant views, namely the proxy view (42.1%) and the ensemble view (38.2%) – see Table 5. Tool views, nominal views, and computational views are significantly less frequent with a combined 19.2%. The articles were also examined one level below the five top-level groupings and classified accordingly. This distribution of ICT conceptualizations in the mobile article pool varies greatly from Orlikowski and Iacono’s (2001) findings within IS in general. In fact, the proportions here are almost reversed. While the nominal view makes up almost a quarter of all articles examined in the original paper, only 6.6% of the mobile ICT articles display this understanding. This is unsurprising, given that the author selected articles precisely for their focus on a specific technology, namely mobile ICT and more importantly that several articles only nominally discussing mobile ICT were thus excluded from the pool to begin with. Furthermore, one could argue that research on mobile ICT - an emerging, non-mainstream IS issue - must constantly justify itself as worthy of attention. Accordingly, authors can hardly avoid specifying the artifact to a certain extent. The computational view of ICT, common in standard computer science literature, is nearly as widespread in Orlikowski and Iacono’s (2001) ranking as the nominal view. However, only 2.6% of the articles in the mobile ICT pool display this view. This corresponds to a wider decline of the IS development stream in academic IS (Sidorova et al., 2008). Indeed, one of the papers in the pool laments the shortage of design-oriented IS research on heterogeneous mobile environments (Krebs et al., 2004). The tool view represents the typical social scientific conceptualization of ICT as a black-boxed instrument that enhances or transforms social practices (Orlikowski and Iacono, 2001). Again, its high proportion in overall IS research (just over 20%) is not matched in the present article pool: only 10.5% are classified as tool views. Of these, most describe mobile ICT as an information-processing tool, for instance linking the adoption of mobile ticketing in public transport to enhanced revenue management (Li et al., 2009). Conversely, no papers view mobile technology as a labour substitution tool – undoubtedly because humans use mobile ICT rather than being replaced by it. What explains this scarcity of tool views? Conceptualizing technology as a tool usually involves quantifying its impact. While such an approach supports measuring the aggregate effect of ICTs and processes, researching the impact of specific technologies - such as mobile ICT - is more meaningfully explored by asking how this impact occurs (Sheng et al., 2005). Only one article views mobile ICT as a tool that determines social relations, thus showing that many mobile ICT researchers engage closely with the artifact to avoid oversimplification (Brigham and Introna, 2006).

Slightly less than half of the articles in the mobile ICT pool display the proxy view: an understanding of mobile ICT through surrogate measures, most prominently the technology’s perception. This view, present in merely 18.1% of the original study, is most commonly found in the aforementioned multitude of articles on individual-level adoption of mobile services. Given that mobile technology is redefining established notions of ICT use (Ferneley and Light, 2008; Yoo, 2010), these articles do little to promote a “return” to the technology artifact. Furthermore, they potentially confuse mobile ICT with the measure representing it (Orlikowski and Iacono, 2001). Nevertheless, differentiated accounts of technology perception beyond conventional technology acceptance models do appear in the mobile ICT article pool (see Jarvenpaa and Loebbecke, 2009). Similarly widespread is the ensemble view, underlying 38.2% of the mobile research pool - a threefold increase since Orlikowski and Iacono (2001) explicitly called for it. This represents the clearest divergence between mobile ICT research and the dominant IS paradigm. Most ensemble views found in the mobile ICT article pool conceptualize the artifact as either an embedded system or a production network. An illustrative example of the former is provided in Lucas and Goh’s (2009) description of how digitalization...
transformed not only digital camera technology, but the entire sociotechnical process of photography. Kietzmann’s (2008) study of the complex networks involved in RFID innovation processes exemplifies the latter subset of ensemble views. Both constitute good indications of how the sociotechnical complexities of “real world” mobile technology are being appreciated in mobile ICT research.

6 Discussion

The aim of this paper has been to understand the extent and nature of the Information Systems field’s agility in absorbing emerging socio-technical phenomena and through research collectively engage in a process of deciding how to comprehensively deal with these phenomena. The paper argue that mobile ICT forms an important example of an environmental change, which the mainstream IS field must be able to respond to through dealing with the phenomenon in journal articles. Lyytinen and Yoo (2002b) argued exactly this in their call to arms over a decade ago. The findings from the study of 2001 journal articles published within the “basked of eight” Information Systems journals between 2000 and 2010 show a diversified representation of practice in the small Information Systems subset of mobile ICT research. In some respects, the picture is in line with overall IS research, most visibly in the focus on a proxy view of individual-level services. Beyond that, the IS literature on mobile technology displays several approaches that account more explicitly for mobile technology and practice. These include a strong interest in interorganizational mobile infrastructures and a surprisingly frequent conceptualization of mobile ICT as a sociotechnical ensemble - approaches that are located beyond the dominant IS paradigm (Orlikowski and Iacono, 2001; Lyytinen and Yoo, 2002b). Since the data was collected and analysed in 2010 the IS field may have changed slightly, with a couple more European based journal special issues. However, the IS field still has not established a significant response to the challenge of mobile ICT, and this is only one of the challenges to our field’s academic agility. Perhaps we can tentatively hypothesise that research into mobile ICT has not managed to establish a “mobilities turn” within Information Systems, as research into mobilities has within social geography and sociology (Urry, 2007). This turn has gathered researchers around a research agenda and even resulted in a new journal. Within IS, it has been a challenge to identify a theoretical discourse linked to the emerging phenomena, which could be strong enough to break through the rigorous inspections of knowledge claims in the mainstream journals. The level of research into mobile ICT has therefore mainly been one where socio-technical practices are studied empirically but where the theoretically constructs are not directly related to the category of technology.

The choice of mobile ICT offered a phenomenon with global impact and one that is continuing to undergo rapid changes. It is, however, merely one indicator of the lack of academic agility within IS to rapidly and resourcefully consider emerging socio-technical phenomena within a mainstream context. A quick scan of possible external phenomena the IS field will need to incorporate at least as empirical objects, but also possibly as more substantial areas providing sources of theoretical insights reveal, for example; 3D printing, 3D scanning, machine learning, mobile robots, machine-to-machine communication, augmented reality, in-memory databases, smart cities, sustainable IT, near-field communications (NFC), contactless payment, wearable computing, gamification, crowd sourcing, big data, consumer telematics, quantified self services, consumer-managed automation, and the internet of things. There is not end in sight with the granularity of technological materiality diminishing, converging and reconfiguring at a staggering pace (Brynjolfsson and McAfee, 2014).

With increasing complexity of technological arrangements come an increasing need for critical insights into design choices and their consequences based on current knowledge of state-of-the-art. If the Information Systems field cannot establish an arrangement with a sufficiently rapid feedback-loop between digital innovation processes and the academic process offering essential reflection, then the field will not be able to offer relevant insights. As has been argued within management studies (Tushman and O’Reilly III, 2007), the Information Systems field need to locate its own way of rapidly
reconfiguring its Pasteur’s Quadrant (Stokes, 1997). This paper is not about impact and considerations for use, but merely the first all-important phase of discovering new sociotechnical configurations and assessing, within an academic context, to what extent these configurations can offer new insights, need to be understood as new categories of phenomena. In this sense, this paper is a call for action to the IS field of developing more agile boundary spanning practices and to more comprehensively support those engaged in boundary spanning (Williams, 2002; Levina and Vaast, 2005). The inclusion of a diversity of journal editors representing interest in emerging phenomena, establishing different types of opinions and discussion papers, and establishing special issues on emerging subjects can clearly be one way of dealing with the issue of academic agility. However, considering academic agility as a case of organisational ambidexterity (Birkinshaw and Gibson, 2004; O’Reilly and Tushman, 2004) then the academic incentive structure of increasingly important classification of acceptable journal outlets and rankings can easily counter this and further result in emphasis placed on exploitation over exploration. It could also be argued that in the context of a field seeking to respond in an agile manner to emerging socio-technical phenomena, the most productive first response should be seeking to apply a qualitative, explorative approach, rather than draw on a positivist paradigm requiring a range of strict assumptions up front. The problem and opportunity is paradoxically in the inherent contextual ambidexterity of our academic field. The balancing of exploitation and exploration is to a large extent left to individuals. This can, for example, lead to mobile ICT being extensively studied in Scandinavia, yet with little theoretical impact on the mainstream Cross-Atlantic IS field, while the Anglo-Saxon IS research community for decades did not study the phenomena at all (Sørensen, 2003).

We will leave the discussion of viable strategies for addressing the issue to another paper, but a range of efforts could support increased academic agility, such as: Increased individual professionalization in balancing exploitation and exploration; more diverse editorships of journals; increased stratification of categories of papers within journals; and increased importance of citations leading to conference papers increasing in importance. It is, however, obvious to us that the battle for increased IS agility is not over yet.

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