**Chapter 13**

**Workplace “Digital Culture” and the Uptake of Digital Solutions:**

**Personal and Organisational Factors**

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**Introduction**

The study of technology acceptance has generally focused on single technologies in specific contexts, be that home, work, or a business sector. This chapter addresses the broader question of technology acceptance across the UK workforce as a whole. In doing so the chapter tries to understand the non-technical barriers to UK industry taking up digital solutions. Over the last 60 years there have been repeated cases of digital technologies causing substantive disruption to business practices and markets, often with both negative and transformative impacts on those businesses and markets (e.g., email, internet, or office software, and more recently, iTunes and Uber). Predicting such disruptions is complex, and at times impossible. However, the digital sector itself argues that 25% of companies are likely to have their business, organisational structures, or work practices disrupted by digital solutions over the coming three years (Bradley et al., 2015; Brecher et al., 2016). This chapter is not focused on predicting such transformations, but rather seeks to understand the broad organisational factors that might impact the ability of businesses and institutions to respond to digital change. Tied to this is the fact that digital technologies pervade the home as much as work. In everyday life, the ease of use of such things as smart phones and apps gives the impression that the public, that is the workforce, can easily take on new technologies. Ensuring the engagement of the workforce is essential when organisations are actively trying to prepare for digital disruption, or to implement new digital solutions (Edwards & Ramirez, 2016; Reynolds, 2015). This leads to questioning the extent to which organisations can rely upon digital skills transferring from domestic or non-work settings to the workplace.

The public and media perception of the UK as a technologically and digitally engaged society masks a far more complex and less optimistic reality. This is very much the case for personal digital media use, with considerable class and age differences in access and use (see Yates et al., 2015; Yates & Lockley, 2018; and Chapter 15 in this volume). As prior research on commercial organisations has found, a large proportion (43%) of businesses have yet to respond at a leadership or board level to the disruption that digital technologies may bring to their sectors (Loucks et al., 2016). Others have found that around 30% of UK SMEs are not online or using the Internet in very limited ways (Lloyds Bank, 2017). One link between these home and work issues has been the focus of much government policy on closing the digital divide by ensuring digital access at home (see UK government, 2014: Digital Inclusion Strategy). This is in part because it is assumed that digital skills at home will transfer to other aspects of citizens’ lives. The digital divide at work, both between organisations and their workers, has not been a major concern until recently—for example, moves to bring coding to the curriculum and the identification of substantive IT skills gaps in the workforce. A future research and policy challenge is to understand access to and use of digital in UK small and medium sized enterprises (SMEs).

As an initial step in understanding these issues, this chapter reports on a national survey of UK employees of all grades and sectors. This survey explores employees’ personal experiences of digital technologies at home and work, their evaluations of the effectiveness of the technologies, and the digital culture in their organisation. In some research (Robey & Azevedo, 1994), much digital industry marketing, and more general media coverage, digital technologies are claimed to be quick and efficient fixes to complex organisational issues (Lloyds Bank, 2017). This, along with potential digital transformations and issues of access, use, and skills creates considerable challenges around ensuring the success of digital technologies in the workplace. Such challenges raise questions about which organisations are best able to manage such change, as well as the types of organisations and the economic sectors that are engaging with new digital solutions. Questions considering the major barriers to uptake are also important—especially practical challenges such as finances and legacy systems, or issues of leadership, vision, and organisational culture.

By taking a national workers’ perspective, this chapter fills a gap identified in research that looks into attitudes to digital technology acceptance. It explores the factors that influence digital roll-outs by focusing on the experiences and perceptions of the UK workforce as a whole with the expectation that introducing new technology alone is not enough.

This chapter presents a review of approaches to technology uptake and applies the ideas to the survey of 3040 UK workers, and is divided into eight sections. The background to the report, including prior academic work concerning technology acceptance and the framing of the research questions, is presented in section two. Section three examines which organisations are rolling out new digital solutions, analysed by sector and by organisation size. Section four examines the UK workforce's experience with and use of digital technologies at home. The experience of digital technologies and their implementation at work by organisation sector and size follows in section five. Section six further explores the communication channels used by organisations when rolling out new digital solutions. Section seven examines the UK workforce's experience of organisational barriers to the implementation of digital solutions. Section eight develops a statistical model of the most important factors that influence perceptions of the success (or not) of new digital solutions, based upon the results from the previous sections. The chapter ends with an overall summary, the importance of culture and strategy, and final conclusions including the role of leadership.

**Understanding and Measuring Technology Acceptance Factors**

Technologies don’t just drop into place or spontaneously emerge; at both home and work they have to become accepted. Technology acceptance models (Davis, 1989; Ventakesh, 2000; Ventakesh et al., 2003) have tended to focus on two areas:

* perceived usefulness – the extent to which a worker or home user believes that using a technology would enhance the task they are engaged in
* perceived ease-of-use—the extent to which a worker or home user believes that using a technology would be free from substantive effort

These two issues have been measured in a variety of ways in a range of studies (Adams, et al., 1992; Segers & Grover, 1993; Szajna, 1994). Many of these studies have a very individualistic focus—they look at the motivations and rational behaviours of individual users. The organisational or personal situation of users is a context in which they engage with the technology. More recent research by Ventakesh and Davis (2003) has identified four factors to explore:

* *Performance expectancy,* parallel to perceived usefulness, is the degree to which an individual believes that using the system will help him or her to attain gains in job performance.
* *Effort expectancy,* parallel to perceived ease-of-use, is the degree of ease associated with the use of the system.
* *Social influence* is the degree to which an individual perceives that important others believe he or she should use the new system.
* *Facilitating conditions* are the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system (Ventakesh & Davis, 2003).

This chapter considers the role of context as well as personal factors implicit in these four factors. It therefore explores how personal attitudes, use, and confidence mix with organisational culture to influence attitudes to digital technologies at work.

This research has looked at the issue across a national sample of the UK workforce, whereas technology acceptance models have tended to be applied to specific case studies. These are mainly studies of the uptake of technologies by specific organisations, from SME's to large corporate organisations (Bruque & Moyano, 2007; Fitzgerald et al., 2013). The majority of case studies are also focused on one single technology (e.g., social media, Alduwaila & Ali 2013; Rauniar et al., 2014), or sector (e.g., healthcare, Cresswell & Sheikh, 2013; Xie et al., 2013, or ICT and telecommunications, Barnes, 2012). This chapter therefore presents a unique national picture of the issues, challenges, and best practice around digital technology uptake and acceptance by the UK workforce.

Making use of the technology acceptance approach described above, a set of personal and work factors that could be assessed were identified. Often ease of use, expected ease of use; performance, and effort are measured in relation to specific technologies. The UK workforce is today exposed to as many if not more technologies at home as they are at work. It was therefore important to assess different aspects of home and work use: from confidence, to the types and range of digital technology use. The survey questions about the UK workforce's personal use across home and work included:

* Personal experience and confidence at home: Confidence, Acceptance of new technology in the home, and Range of home use (using measures taken from the Ofcom, 2016 media literacy survey)
* Personal experience and confidence at work: Confidence, and Being a knowledge worker

To understand the social and facilitating issues highlighted by technology acceptance models the questions were split across:

* Organisational challenges (predominantly facilitating issues): Company/Organisational sector, Company/Organisation size, and Internal organisational issues (e.g., finances and legacy systems)
* Organisational culture (predominantly social issues): Attitudes to digital in the organisation, and Digital leadership in the organisation

**Survey and Analysis Methods**

**Defining Digital Solutions**

What is meant by “the roll-outs of digital solutions”? Often the focus is on high end, big ticket, or disruptive digital technologies such as cloud solutions, social media, and mobile applications. The UK workforce is more likely to encounter a wider range of business-critical systems such as clocking on tools, or regulatory compliance tools. Considering this, the following was articulated to all of the respondents at the start of the survey:

“In this survey we are interested in understanding your use of digital technologies at work and in your home. When we talk about digital technologies we specifically mean software, apps, devices, and any equipment that uses the internet to play a role in digitising documents, processes or tasks.”

The survey included Table 1 to provide examples and a reference point for respondents.

--- Table 1 ---

**Sample and Analyses**

The survey comprised 3040 online interviews with UK employees aged 16 and over. Data was gathered between 12 and 16 April 2016. The survey was a nationally representative structured sample of UK employees based on an existing panel managed by Censuswide (www.censuswide.com). The survey was designed by the authors and administered by Censuswide.

The data were subjected to a range of statistical analyses:

* Categorical data were subjected to χ2 analyses, and statistically significant variations between cells were identified by column proportion z-tests.
* Ordinal and ratio data relations were subjected to bivariate correlation analyses, using both Pearson and Spearman methods as appropriate.
* Comparison of ordinal and ratio data by category was undertaken using General Linear Modelling (ANOVA, MANOVA).
* Home use data was grouped using the K-means Cluster method.
* The overall regression model was developed using SPSS Automatic Linear Modelling.
* Significance levels were set at *p<*.05, and for multiple tests significance levels were set using the Bonferroni method

**The Extent to which UK Organisations and Sectors are Digitising**

The survey sought to understand the overall national position in terms of who, how many, and why digital technologies are being rolled out. The UK workforce responses about the existence roll-outs are compared by organisational size and sector variations to answer three questions:

* Whether there have been roll-outs
* How many roll-outs
* If UK workers have perceived an increase in the rate of roll-outs

**Presence and Number of Digital Roll-Outs, by Organisational Size and Sector**

As the survey covered a representative sample of the UK workforce, this includes people who do not use digital technologies at work, and those who have not seen any new digital tools at work for quite some time. Indeed, overall 29% of the surveyed workers were not aware of digital solutions being rolled out in their organisations. This number is in line with prior research that found over 30% of SMEs were not online and not using many, if any, digital tools (Lloyds Bank, 2017). Taking a binary measure of workers’ experiencing digital rollouts (or not), employees of smaller organisations were statistically significantly more likely to indicate that they had not experienced digital rollouts (see Figure 1; one-way ANOVA, Welch (1, 3039) = 1384.6, *p<*.001, with a medium effect size (*η2* [eta squared] = .54)).

--- Figure 1 ---

The size of an organisation might influence the number of digital solutions that the UK workforce encounters. Looking at the number of new digital solutions the UK workforce has reported, there is a statistically significant difference in relation to the size of organisations (one-way ANOVA, Welch (6, 2369) = 800.6, *p<*.001, medium to large effect size (*η2* = .11), with the average company size for no roll-outs being 50-99 employees. Those working in organisations of 100 or more people are more likely to have encountered three or more new digital technologies over the last two years than those in smaller organisations (see Figure 2 and Table 2).

--- Figure 2 ---

--- Table 2 ---

While more than 60% of the UK workforce in all sectors had knowledge of a digital solution roll-out in their organisation, there are statistically significant differences between the most active and least active sectors in terms of undertaking any digital roll-outs (chi-square test, χ2 (13, 3039) = 93.75, *p<*.001, small to medium Cramer's V =.18). Comparing proportions (z-tests at *p<*.05 with Bonferroni adjustment), the workforce in the Other, Retail, and Catering & Leisure sectors were the least likely to see new digital solutions. Not surprisingly 'IT and telecoms, followed by Finance and by Professional services, were statistically the most likely (see Figure 3).

--- Figure 3 ---

The number of roll-outs the UK workforce has experienced at work in the last two years also significantly varies across sectors. The same sectors as above are statistically more likely to have new digital solutions than the other sectors (see Figure 4; one-way ANOVA, Welch (13, 2369) = 8.85, *p<*.001, small effect size (η2 = .05)).

--- Figure 4 ---

### **Increase in Digital Solutions Being Used, by Organisational Size and Sector**

### The survey also asked if the UK workforce had seen an increase in the number of digital solutions deployed in their industry in the last two years. Employees of smaller organisations were statistically less likely to report this (one-way ANOVA, Welch (2, 3040) = 16.5, *p<*.001), but the effect size was very small (η2 = .01). There are some statistical differences by sector (χ2 (13, 2616) = 37.53, *p<*.001, small to medium Cramer's V =.12). Based on comparing proportions (z-tests at *p<*.05 with Bonferroni adjustment), workers in the IT & Telecoms sector were statistically most likely to indicate they had seen an increase in new solutions, while workers in the Other and in the Travel and transport sectors were the least likely (see Figure 5).

--- Figure 5 ---

**Reasons for Digital Roll-outs, by Organisational Size and Sector**

Respondents who had experienced digital roll-outs were asked what they thought the organisation's goals or reasoning had been for the implementation. The three main reasons given by the UK workforce were: to cut costs, to automate processes, and to improve productivity (see Figure 6).

--- Figure 6 ---

There were some statistical differences by company size (χ2 (54, 9296) = 190.50, *p<*.001, small to medium Cramer's V = .12). Comparing proportions (z-tests at *p<*.05 with Bonferroni adjustment), we find that workers in organisations with more than 500 employees were statistically most likely to point to automation of processes. Those in organisations with 50 to 249 employees were more likely than those in larger organisations to point to meeting regulatory requirements as a key reason, while those in organisations with under 50 employees were less likely to point to regulatory requirements.

Similarly, there were differences between sectors that indicate workers in these areas understood the different business contexts for digital solutions (χ2 (117, 15063) = 288.62, *p<*.001, small to medium Cramer's V = .14). Comparing proportions (z-tests at *p<*.05 with Bonferroni adjustment):

* The HR, Manufacturing & Utilities, and Professional sectors were slightly more likely to think the goal is to make the business more competitive
* The Healthcare sector was slightly more likely to see the goal as being to meet regulatory requirements
* The Other sector was more likely to be unsure of the reason for rollouts.

**Summary**

Both organisational size and sector are statistically linked with the UK workforce's experience of new digital solutions in their organisations. Workers in smaller SMEs were less likely to encounter new digital solutions whereas workers in organisations with more than 100 employees are more likely to encounter digital solutions being implemented. Workers in the Professional and Technology sectors were more likely to have seen digital solutions implemented in their organisation. The rate of roll-outs was also influenced by sector.

**Digital Efficacy: Digital Skills at Home and in the Workplace**

This section provides an overview of the respondents’ uses of, and levels of confidence in, digital technology use at home. Ofcom's 2016 report found that 87% of the UK population had been online in the previous year, a number that has been relatively consistent over the last three years. What is changing is that the use of laptops and desktops to go online is decreasing as the use of smart phones and tablets rises. This might mark a shift to using mobile smart devices at home, while continuing to use laptops/desktops at work in the medium term. Such a shift would make the personal and work experience of digital technologies quite different.

**Confidence and Use at Home and at Work**

UK workers generally felt confident in technology use at home (Table 3), and the majority liked to have new technology at home (Table 4).

--- Table 3 ---

--- Table 4 ---

Using similar questions to Ofcom's Media Literacy Survey (2016), Yates et al. (2015) identified five factors underlying the Ofcom Internet use questions. The current survey deployed the five questions most strongly associated with the factors found by Yates et al. Reponses to these were then subjected to a cluster analysis. Clustering Ofcom respondents by their factor scores, Yates et al. identified seven categories of users. However, due to the lack of unemployed and retired respondents in our sample, it was not likely we would find the same number of clusters.

The analysis undertook a two-stage approach to clustering the data. The first step used a standard hierarchical cluster analysis under SPSS. As the factors were z-scores, a squared Euclidean distance measure of cluster separation under Wards clustering method was used. The final 10 steps of the analysis showed clear breaks in the rate of change of the cluster coefficient scores at two, three and six clusters. Descriptive analysis of the means for a two-cluster solution indicated that the clusters separated limited users from the rest of the sample. Six clusters provided a more informative set of user types than three and is therefore used here. The cluster analysis was therefore re-run with the k-means cluster technique applied to the data with a target of six clusters and iterations repeated until results converged. Table 5 presents the mean z-scores for our five factor associated measures at the centroids of the clusters, and potential descriptors for these groups.

--- Table 5 ---

As with the Ofcom analysis, older people were statistically more likely to use the internet less at home and be Very limited users, General media users, or Only social media users (one-way ANOVA, Welch (5, 2982) = 97.89, *p*<.001, large effect size (η2 = .13)). Also, those in Senior manager/Professional roles were statistically more likely to be Politically active extensive users or Non-political extensive users (χ2 (40, 2982) = 222.35, *p*<.001, small to medium effect size, Cramer's V = .12, comparing proportions (z-tests at *p*<.05 with Bonferroni adjustment)). The sample matches closely the national picture with regard to access, use, and confidence at home.

We next examine how home use and confidence is associated with attitudes and confidence at work. The survey directly asked about confidence in ICT use at work. Overall, the UK workforce felt fairly effective in their use of digital tools at work. There are no major statistical variations by sector or size of organisation. As noted above, feeling effective in your use of technology is one of the key elements of technology acceptance. These are of course responses from those workers who have experienced digital technologies at work.

A key research question considered if home and work confidence were related. The claim is that there is transference of digital efficacy from home to work and vice versa. In fact, it was found that work and home confidence are only weakly statistically correlated. Given that it is often claimed that younger people have greater digital skills, it was possible that age might be a complicating factor, with young people being confident at work and home, and older people less so. Again, though younger people are slightly more likely to be confident with digital at home, this is a very weak statistical difference. The link is even weaker for workplace confidence. Overall less than 1% (age) and 6.5% (home confidence) of the variance is explained in these correlations with respondents’ confidence scores at work (see Table 6). In fact, type of work is a better predictor of confidence with digital than is age. Self-identifying knowledge workers in the survey had a statistically much higher workplace confidence with digital technologies than did non-knowledge workers (one-way ANOVA, Welch (1, 2825) = 355.80, *p*<.001, very large effect size (η2 = .83)). In contrast, level of employment was no better a predictor of workplace confidence than were age or home (weak correlation, *r* = .18, *p*<.01, two-tailed).

--- Table 6 ---

**Summary**

The sample in this survey appears to contain similar user types to that of the annual UK national Ofcom survey of Internet use. As with the Ofcom data, age and level of employment were statistically linked to user types. Within the data, workplace confidence and home confidence were not strongly linked: organisations cannot assume that their workforce will gain the digital skills they need from home use. Additionally, although younger people are slightly more confident than older people in their use of digital at home and work, this is not a substantial difference. The type of work (being a knowledge worker) is more important in relation to workplace confidence than the level of employment.

**Experiences of Digital Technology Roll-Outs**

This section explores the UK workforce's experience of digital tools at work. First we examine which workers are experiencing new digital tools at work, followed by workers’ attitudes to the number of roll-outs, including their perceived success; these are compared across sectors and work status. Lastly, the attitudes of information workers when new tools are rolled out are explored.

**Knowledge Workers and Digital Roll-Outs**

Those workers who indicated that they handle knowledge and information in their work had seen statically more roll-outs in their organisation than other workers (see Figure 7; one-way ANOVA, F (1, 2369) = 112.50, *p*<.001, medium effect size (η2 = .06)).

--- Figure 7 ---

**Attitudes toward Number and Success of New Digital Solutions Rolled Out**

In terms of attitudes to the number of roll-outs, there was no statistical variation by sector. Overall 65% of the UK workforce who had experienced roll-outs thought the number of roll-outs "were about enough". Though there are no major statistical differences between sectors in UK the workforce's perceptions of successful roll-outs (see Figure 8), a third of workers who experienced roll-outs think that only some, few, or none of these were successful. Importantly, as argued in regard to technology acceptance, perceptions of the success of digital roll-outs are essential to their uptake and acceptance and vice versa. The analyses in earlier sections indicate that 29% of UK workers believe they have not seen new digital solutions at work. A third of the UK workforce believing that the majority of digital roll-outs they experienced were not successful presents a significant challenge to both UK business organisations but also to the suppliers and developers of solutions. Predicting this measure of perceived success from aspects of organisational culture, constraints, and communication methods will be discussed below.

--- Figure 8 ---

**Experiences and Opinion of Roll-Outs by Job Position**

Looking at the job position (level of employment) of the UK workforce, those in most professional management roles, and directors, are more likely to have experienced digital roll-outs than other workers (see Figure 9, χ2 (8, 2982) = 213.94, *p*<.001, small to medium effect size, Cramer's V = .27, comparing proportions (z-tests at *p*<.05 with Bonferroni adjustment)).

--- Figure 9 ---

The survey asked workers if the new digital technologies that had been brought to their company had made a positive or negative impact on their job role. Figure 10 shows the percentage of the resondents noting each statement.

--- Figure 10 ---

Of the set of 10 possible positive impacts only three were statistically significantly associated with the belief that roll-outs had been successful (univariate GLM, overall F(10, 1975) = 17.05, *p*<.001):

* It made it easier to do my job: (*F*(1, 1975) = 51.92, *p*<.001, small effect (ηp2 = .03))
* It made it quicker to do my job: (*F*(1, 1975) = 10.73, *p*<.001, small effect (ηp2 = .01))
* It streamlined internal processes: (*F*(1, 1975) = 11.98, *p*<.001, small effect (ηp2 = .01))

This would imply that technologies that ensure these three impacts on workers’ job experience are more likely to be perceived as successful by the workforce. This fits with the technology acceptance model described above, as perceived usefulness was a key factor in acceptance.

--- Figure 11 ---

In the case of the eight possible negative impacts (Figure 11), two issues were statistically significantly associated with a more negative attitude to digital rollout success (univariate GLM, overall F(8, 1975) = 14.43, *p*<.001):

* It made it harder to do my job (*F*(1, 1975) = 4.96, *p*<.023, very small effect (ηp2 = .003))
* It disrupted internal processes already in place (*F*(1, 1975) = 13.38, *p*<.001, very small effect (ηp2 = .007))

This implies that complex systems that disrupt existing process are less likely to be seen as successful by the UK workforce. This fits with the technology acceptance model described above as perceived lack usefulness was a key factor in rejection of technologies.

**Other General Features of UK Workforce Attitudes to Digital Technology**

Before looking at how all the personal and workplace factors contribute to influence the attitudes of the UK workforce to digital technologies, some conclusions can be drawn. The UK workforce was predominantly digitally engaged: 83.6% stated that they have confidence in their home use of digital technologies. The UK workforce were also inclined to accept digital technologies in the workplace, with 45% stating that at least half of their working day is spent using digital technology of some kind. Two thirds (67%) of the respondents stated that digital technology has had a positive impact on the way they work, with 56% saying it had made their job quicker and 50% saying it had made their job easier. People are also pragmatic about being digital in the workplace: most (65%) thought that the number of new digital services that had been rolled out in the past two years was just about right. Respondents who had experienced between three and five roll-outs were the most positive. Workers also understood why their employers were implementing these services, with 58% stating it was to make the organisation more productive, 51% to cut costs, and 47% to automate tasks. However, workers want a dialogue on digital technologies: 64% said they were not all consulted prior to the provision of new digital technologies, and 57% said they would have liked more information on how to use new digital technologies, while 40% stated that the digital technology was not explained effectively to them.

**Organisational Challenges and Communication**

The survey explored the UK workforce's opinion of organisational challenges that might be a barrier to digital roll-outs. In the main, the results indicate that these are tied to the size of the organisation and less so the sector they are in. Organisational size and sectors were compared and measured against organisational challenges such as:

* access to hardware
* connectivity
* legacy systems
* financial pressures
* leaders prioritising digital
* not seeing the significance of digital
* resistance to digital within areas of the organisation
* need for training

**Challenges, by Organisation Size, Sector, and Successful Roll-Outs**

Looking at the separate questions about organisational challenges, organisation size is in all cases statistically significantly associated with level of challenges being faced. Overall, larger SME's (50 to 500 employees) faced the greater number of organisational challenges (see Figure 12).

--- Figure 12 ---

Sector is statistically associated only with organisational resistance, and need for training. In both cases this arises from small differences between the technology intensive and organisational change sectors (IT, Architecture and HR) and the rest of the UK workforce.

The levels of organisational challenges were compared to whether workers thought that roll-outs were successful. Not surprisingly, workers who thought most or all solutions were successful work in organisations with fewer challenges (see Figure 13).

--- Figure 13 ---

**Communication and** **Leadership**

**Communication channels.** The survey also explored what methods organisations had used to communicate with the workforce about the implementation of new digital technologies. The four main methods were (see Figure 14).

* Email
* face-to-face
* dedicated training sessions
* company intranets

The only statistically significant difference across the sectors was that the Professional services sector was more likely to use company intranets than were the other sectors.

--- Figure 14 ---

### **Successful communication**. The channels used significantly differed by whether workers felt that they had been provided adequate communication about the roll-out (one-way ANOVA, Welch (13, 2369) = 8.85, *p*<.001, small effect size (η2 = .05)) (see Figure 15). The strongest positive differences across perceptions of adequate communication were: Face-to-face interaction (Welch (3,300) = 55.47, *p*<.001), and dedicated training (Welch(3, 315) = 46.99, *p*<.001). Third party communication, and (obviously) a lack of communication, were statistically associated with workers feeling that communication was inadequate.

--- Figure 15 ---

### **Communication channel and perceptions of successful roll-outs**. Perceptions of successful roll-outs differed significantly by communication channel (see Figure 16), with the strongest positive differences for Face-to-face interaction (Welch (5,233) = 15.64, *p*<.001), and dedicated training (Welch (5,233) = 9.41, *p*<.001).

--- Figure 16 ---

### **Leadership**. Four questions related to leadership around digital technology uptake in the organisation. Two questions were about positive aspects of leadership such as vision and consultation, and two were about the absence of leadership around digital uptake and planning. Combining these into an overall leadership score, there is a strong statistical relationship between high leadership scores and workers seeing digital roll-outs as being successful (ANOVA, Welch (5, 159) = 25.84, *p*<.001) (see Figure 17).

--- Figure 17 ---

Some sectors demonstrated significantly much higher levels of digital leadership as perceived by the workforce (ANOVA, Welch (13,447) = 4.03, *p*<.001) (see Figure 18).

--- Figure 18 ---

**Summary**

Three main conclusions can be drawn from the results presented in this section. First, the UK workforce identifies several traditional practical barriers to digital solutions – from finances to organisational structures. These challenges vary by organisational size and sector. Second, internal communication is key to employees’ perceptions of digital technologies, both in terms of the specifics of a new digital solution and the overall approach and vision of digital technologies for the organisation. Third, leadership is key to ensuring that the workforce perceives digital roll-outs as successful. These may seem somewhat obvious and good practice, but it is important to remember that digital technologies are often introduced to “solve” organisational challenges, perhaps being seen as the “magic silver bullet”, when in fact successful digital roll-outs occur where these broader organisational, leadership, and environment issues are already being addressed: in short, where organisational culture supports implementation of digital technologies.

**Building a Model of Workplace Digital Culture**

This section develops a model that explains factors that are most important in predicting perception of successful digital roll-outs by the UK workforce. To begin with, the complexity of the questionnaire responses is reduced by developing measures of organisational culture and challenges.

**Measures of Organisational Culture**

In the survey, 27 questions addressed workplace culture, organisational issues, and personal confidence and use at both home and work. In order to make better sense of this data and to identify underlying issues, all the items were entered into an exploratory factor analysis.

All items were suitable, having correlation coefficients above *.*3 and communalities above *.*3. The Kaiser-Meyer-Olkin value was *.*91, above the recommended value of *.*6 and Bartlett’s Test of Sphericity was significant (χ2 (351) = 24519.03, *p*<.001). The PCA revealed the presence of four factors explaining 33.9%, 12.5%, 6.1%, and 5.5% of the variance, respectively. The rotated solution indicated a relatively simple structure showing strong loadings and all but one of the variables loading substantially on only one component (>0.4). There was relatively weak correlation between factors (*r*<.30) except for factors 1 and 4 (*r*=.59). These four factors were therefore retained and factor scores were calculated using the Anderson-Rubin method. Table 7 provides the items, factors, and loadings. The four factors appear to measure:

1. negative digital culture
2. positive digital culture
3. personal confidence at home
4. organisational challenges

--- Table 7 ---

**A Model of Factors Leading to Perceived Success in Digital Technology Implementation**

It is now necessary to explore how all these issues work in combination. There are four areas of the UK workforce's experience and attitudes that might affect their perceptions of digital roll-outs:

* *Personal confidence at home* (this is measured by the factor score; it is also useful to include other personal aspects such as gender, age, job type, and level of home use)
* *Personal confidence at work* (this is measured with a survey question; it is also possible to include other work aspects such as being a knowledge worker and level of employment)
* *Organisational factors* (measured using the factor score; some other organisational issues such as the size and sector of the organisation can also be included)
* *Organisational cultural factors* (this can be measured using the positive and negative culture factor scores)

It was also noted previously that there is a strong correlation between perceptions of usefulness and the UK workforce's belief that digital roll-outs were successful. Therefore, this has been used as a measure of engagement with digital technologies.

As this was an exploratory analysis of the data, we undertook an All Possible Regressions or Best Subsets Regression approach. Though there is debate over this approach, it has been recommended by scholars in a number of recent statistical methodology texts (such as Chatterjee & Hadi, 2012; Montgomery et al., 2012). All of the measures discussed in the previous sections were therefore placed into an Automatic linear regression under IBM SPSS. The analysis therefore develops a model providing the highest R2 solution. This allows us to assess how much each factor affects the proportion of perceived roll-outs seen as being successful.

The regression analysis produced a model that predicts 27% of attitudes to digital roll-outs. This is a reasonably robust result in the context of social research—especially given the complexity of the social and work context being studied. Within the model the following factors were most important: Confidence with ICT at work; Positive digital culture at work; and Negative digital culture at work. Table 8 and Figure 19 present the key features of the model.

--- Table 8 ---

--- Figure 19 ---

It is notable that confidence at work is the most important predictor here, and home confidence the least. Though statistically significant, home confidence explains barely 1% of the variance, compared to 40% for work confidence. Positive cultural factors also outweigh the impact of negative ones (26% to 13%). Issues such as organisational sector, age, and company size are associated with the outcome but only by a small amount (3% to 6%).

**Conclusions for Organisations from the Model**

Positive attitudes to digital in the workplace are driven mainly by issues that organisations can address:

* Ensuring workers feel efficacious and confident in digital tool use
* Ensuring a positive organisational culture around the value of digital with management showing clear leadership and involving the work force

There are, of course, practical problems to overcome, but these are secondary to the workplace culture issues, with some sectors having greater challenges than others. Key challenges perceived by workers are finances, connectivity, and legacy systems. Personal factors such as gender, level of employment, home use, and being a knowledge worker, though they show a significant association with perceptions of roll-outs, are not, in this model, the major factors in predicting attitudes to digital roll-outs. Importantly, home confidence with digital technologies does not seem to spill over to positive attitudes at work.

The implication for organisations is that they can shape the success of their digital roll-outs. Organisational cultural factors outdo many traditional practical constraints. As the technology acceptance models argue, linking the personal to the wider organisation context is key:

* Ensuring that workers feel confident in their use of technologies through good training and confidence in the leadership team through good communication
* Providing the organisation with a well communicated clear digital vision
* Taking organisational pride in the adoption of digital technology
* Taking time to match digital solutions to worker expectations
* Valuing the contributions of workers and consulting employees prior to the provision of new digital technologies
* Ensuring that digital solution use is built into staff development and rewards systems

These recommendations may seem like good “common sense,” but to take this approach to digital technology solutions is in fact to turn the telescope around and look at the problem from the opposite angle. Very often digital solutions are brought into organisations to solve challenges that the organisation faces. They are implemented to make things better in and of themselves. However, instead they need to be considered just one part of an overall process of culture change to address the challenges being faced—the integration of digital technologies is only part of the solution. If organisations fail to address the cultural context into which they are placing often expensive and strategic digital solutions, they risk such interventions adding to the challenges they face, not relieving them.

**Conclusion**

**Overall Summary**

This research represents one of the few national surveys of attitudes to digital technology. It is also one of the few national studies of attitudes and opinions of the UK workforce, unlike for instance the Ofcom (2016) research that focuses on personal and home use, or other commercial research that focuses on business, such as the Lloyds Bank digital index (2017). Academic studies have tended to focus on smaller case studies of businesses and single technologies (Alduwaila & Ali, 2013; Barnes, 2012; Bruque & Moyano, 2007; Cresswell & Sheikh, 2013; Fitzgerald et al., 2013; Rauniar et al., 2014; Xie et al., 2013). Though the results presented are very much in line with prior studies, the findings are scaled to a national context.

This study indicates that a large proportion of the UK workforce is not seeing the benefits of digital solutions. In line with other research (Lloyds Bank, 2017), 29% of the UK workforce has not seen new digital tools at work. A further 33% of those experiencing new digital tools did not think the tools have been very successful. A total of just over half of the UK workforce (51%) say they do not have access to, or are holding negative views of, digital technologies. The findings also indicate that there may be a disconnect between the use of technology at home and work. Individuals may feel they are digitally efficacious at home, but this may not transfer to work. This is important for both organisations and government, as it cannot be assumed that people are able to transfer skills from their everyday social use of technology to the workplace. It also cannot be assumed that “digital natives” and “millennials” entering the workforce represent a skills base or a resource to further digitise organisations (UK Gov, 2016).

Thus the challenges of making a digital UK cannot be solved simply by implementing the latest new technology. Nor does it seem it will be solved by millennials taking a lead. But this research does provide some clear guidance on a route forward that is in fact within the ability of organisations to address.

**Culture and Strategy**

“Culture eats strategy for breakfast” is a quote apocryphally attributed to the business commentator Peter Drucker, although the idea that culture is key to the success of organisational strategy is fairly well established in the academic literature (for example Harper & Utley, 2001; Jackson, 2011; Leidner & Kayworth, 2006; O'Reilly et al., 1991). In these arguments, culture determines and limits strategies (Schein, 2010). Much of this work highlights ways in which organisations can work with their culture. Culture is, in this context, the everyday practices, beliefs, and attitudes of workers in an organisation which is built upon its history, workers’ experiences, and the sectors it works in, as well as those bigger issues of the national and community cultures outside the organisation. Many of these things organisations cannot change by themselves. But this work has found that some of the most important aspects of organisational culture that impact digital are those that can be changed. The following factors appear to influence attitudes to digital solutions (though with widely varying strength):

* personal experience and confidence at home (knowledge of ICTs from home use)
* personal experience and confidence in use of work-based ICTs
* company organisational issues (practical issues)
* company/organisational sector
* company/organisation size
* internal organisational issues (e.g., finances and legacy systems)
* company leadership and attitudes (company culture)
* attitudes to digital in the organisation
* digital leadership in the organisation

The overall model implies that the most important issues are clearly under the control of the organisation:

* Personal experience and confidence in use of work based ICTs (some things that can be addressed through training support and good communication, through both face-to-face and some mediated channels)
* Company leadership and attitudes (taking a lead on digital, making clear the benefits, listening to ideas and developments from colleagues, making digital an organisation wide priority, planning for digital disruption and having a clear digital vision that has been effectively shared)
* Attitudes to digital in the organisation (ensuing that the benefits of digital solutions are understood across the organisation, understanding the likely points of resistance)
* Company organisational issues (ensuring that practical and traditional barriers to digital systems—from poor equipment and connections to legacy systems and financial constraints—are understood and addressed)

At the heart of the findings is the need for organisations to understand that making digital solutions a success is a process of cultural change in their organisation. This change will need to be supported and managed, and certainly should not be driven by simply introducing digital tools and hoping they will force the change.

**Final Conclusion**

This research indicates that the UK workforce sees organisational culture and leadership as barriers to taking up digital solutions—and not traditional factors such as legacy systems or costs. This study provides evidence to suggest that organisations cannot rely on the workforce bringing their personal expertise to the workplace. Social media savvy millennials may not be the solution to help organisations face digital disruption and transformation. Importantly, UK workers are generally positive about taking on digital tools—where they have had experience of it—but they are looking for support, leadership, and engagement to make these changes successful. More broadly, if personal private experience with technology does not guarantee confidence at work, then it may be necessary to ensure that the UK workforce has the skills needed in the digitally transformed workplace. The results indicate that smaller workplaces are less likely to take on new digital solutions, and that practical challenges vary across sectors. But importantly the key issues are leadership, vision, and the transformation of organisational culture.

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Table 1

*Defining Digital Solutions*

|  |  |
| --- | --- |
| Work activity | Examples |
| Systems to manage people in your workplace | Online timesheet or expenses systems / Social recruitment tools |
| Systems to manage the finances and official documents in your workplace | eInvoicing tools/ Digital document archiving /Online billing and payment solutions |
| Sales and customer service systems | Online customer journey mapping /relationship management / communications tools |
| Marketing systems | Web / email / social media marketing tools / Digital customer data or intelligence tools |
| Management systems | Digital business intelligence tools / Online business process management systems |
| Information systems for work place, shop floor or remote working | Remote diagnostics / maintenance tools / design tools /Systems to control or manage manufacturing processes |
| Communications tools | Mobile devices / Workplace communications / social media |

Table 2

*Organisation Size and Number of Digital Roll-Outs*

|  |  |
| --- | --- |
| Number of new digital solutions | Average company size |
| None | 50-99 |
| One | 100-249 |
| Many | 250-500 |

Table 3

*Confidence at Home*

|  |  |  |
| --- | --- | --- |
| I feel confident using digital technologies at home | N | % |
| Totally disagree | 19 | 1.0 |
| Somewhat disagree | 55 | 2.0 |
| Neither agree or disagree | 424 | 14.0 |
| Somewhat agree | 1168 | 38.0 |
| Totally agree | 1374 | 45.0 |
| Total | 3040 | 100.0 |

Table 4

*Access to Technology at Home*

|  |  |  |
| --- | --- | --- |
| I like to have access to the latest technology | N | % |
| Totally disagree | 47 | 1.5 |
| Somewhat disagree | 170 | 5.6 |
| Neither agree or disagree | 793 | 26.1 |
| Somewhat agree | 1208 | 39.7 |
| Totally agree | 822 | 27.0 |
| Total | 3040 | 100.0 |

Table 5

*K-Means Clustering with a Target of Six Clusters*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Use | Only social media users | Social media and general media users | General media only users | Politically active extensive users | Very limited users | Non-political extensive users |
| Media use proxy (watch TV or films online) | -1.53 | .48 | .38 | .59 | -1.59 | .48 |
| Information use proxy (access public services) | -.52 | -.70 | -.27 | 1.19 | -.63 | .76 |
| Political use proxy (contact a politician) | -.40 | -.41 | -.30 | 2.35 | -.34 | -.24 |
| Formal use proxy (pay bills online) | -.37 | -.46 | -.37 | 1.31 | -.47 | .34 |
| Social use proxy (use social media) | .32 | .38 | -2.29 | .17 | -2.32 | .43 |

Table 6

*Correlations of Age, Personal Confidence, and Work Confidence*

|  |  |  |
| --- | --- | --- |
|  | Age | Personal confidence |
| Age | -- | -- |
| Personal confidence | -.18\*\* | -- |
| Workplace confidence | -.10\*\* | .26\*\* |

\*\* *p<* .001, Pearson correlation, two-tailed test

Table 7

*Factor Analysis*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Factors and Loadings** | | | |
| **Item** | 1 | 2 | 3 | 4 |
| New digital solutions rolled out in my workplace do not add value | **.71** | .02 | -.17 | .02 |
| My organisation does not provide the right support when solutions are rolled out | **.70** | -.26 | .01 | .09 |
| I have tried to suggest digital technologies that would benefit our organisation but nothing has come of it | **.69** | .11 | .07 | .04 |
| Culturally, my organisation is not ready to embrace digital solutions | **.66** | -.07 | -.02 | .19 |
| A lack of digital technologies hinders my ability to do my job effectively | **.63** | .06 | .07 | .13 |
| Only some of my employees use the digital technologies available to us in the workplace | **.58** | -.09 | .14 | .04 |
| I wish my organisation would focus on creating a digital culture | **.57** | .15 | .28 | .05 |
| We have digital technologies in place already but haven’t had the training to make best use of them | **.50** | -.17 | -.04 | .28 |
| Our company leaders don’t see digital technologies as a priority | **.41** | .06 | -.18 | .46 |
| Our company leaders don’t see the significance of adopting a more digital way of working | **.44** | .06 | -.17 | **.46** |
| Do you have confidence in the leadership team at your organisation to navigate a more digital world? | -.12 | **.74** | .00 | -.01 |
| The organisation I work for has a clear digital vision | .10 | **.72** | .08 | -.13 |
| As an organisation, we take pride in the way we have adopted digital technology | .08 | **.65** | .18 | -.14 |
| The digital solutions rolled out by my organisation met my expectations | .04 | **.64** | .18 | -.06 |
| Did the leadership team consult employees prior to the provision of new digital technologies? | .05 | **.63** | -.07 | .06 |
| Financial incentive | .36 | **.54** | -.11 | .02 |
| Were the potential benefits of these new digital technologies clearly communicated to you by your organisation? | -.28 | **.39** | -.01 | .06 |
| Tied to personal development goals | -.09 | **.33** | .02 | .03 |
| I feel confident using digital technologies at home | -.16 | .03 | **.81** | .06 |
| I like to have access to the latest technology | .06 | .16 | **.74** | .00 |
| When not everyone adopts digital technology in the same way it makes it less effective | .23 | -.04 | **.52** | .07 |
| We don’t have the necessary hardware to allow us to adopt a more digital way of working | -.05 | -.03 | .01 | **.87** |
| We don’t have the necessary connectivity to support a more digital way of working | .01 | -.03 | -.05 | **.82** |
| The new digital systems don’t easily connect with older systems we have in place | .00 | -.17 | .12 | **.73** |
| Financial pressures are preventing investment in digital technologies | -.03 | .12 | .15 | **.71** |
| We are tied to existing tech or systems that mean we can’t change to more digital ways of working | .13 | -.01 | -.03 | **.70** |
| Our leaders are trying to push through new digital ways of working, but the wider business isn’t interested in changing the way things are already done | .38 | .07 | -.05 | **.39** |

Table 8

*Key Predictors of UK Workforce Perceptions of Successful Digital Roll-Outs*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Type** | **Positive factors** | **Import-ance (%)** | **Negative factors** | **Import-ance (%)** |
| Personal | Personal confidence with digital at work | 40 | Lack of workplace digital confidence and efficacy | 40 |
| Workplace | Positive digital culture including clear leadership | 26 | Negative digital culture, including lack of leadership | 13 |
| Workplace | Being in the arts, professional service, retail, and Catering/Leisure sectors | 6 | Being in the Health, Legal and Travel sectors | 6 |
| Workplace | Small to medium company size (0-500 employees) | 6 | Organisational issues – finances, legacy systems | 3 |
| Personal | Personal home ICT confidence | 1 | Age (35-45) | 3 |



*Figure 1.* Digital roll-outs (or not) by company size.



*Figure 2.* Number of digital roll-outs by organisation size (area represents proportion of cases).



*Figure 3.* Roll-outs or not by sector.



*Figure 4.* Digital solution roll-outs by sector (area represents proportion of cases).



*Figure 5.* Increase in roll-outs over the last two years by sector.



*Figure 6.* Reasons for digital roll-outs.



*Figure 7.* Knowledge worker and number of roll-outs.



*Figure 8.* Proportion of digital roll-outs UK workforce thought successful.



*Figure 9.* Level of employment and number of roll-outs experienced.



*Figure 10.* Positive impacts of new digital tools.



*Figure 11.* Reasons for a negative attitude.



*Figure 12.* Organisation size and challenges to implementation of digital solutions.



*Figure 13.* Levels of organisational challenge and successful digital roll-outs.



*Figure 14.* Communication channels used.



*Figure 15.* Adequate communication and communication channel.



*Figure 16.* Communications channels and successful roll-outs.



*Figure 17.* Leadership and successful roll-outs.



*Figure 18.* Leadership by sector.



*Figure 19.* Regression model of perceptions of successful digital roll-outs.

Note: all predictors are significant at *p*<.05 or better