

Confusion and Collectivism in the ICT Sector: Is FLOSS the answer?

Abigail Marks, Shiona Chillias, Laura Galloway, Gavin Maclean

Abstract

Information and Communication Technology (ICT) workers rarely join trade unions. This is usually explained by the individualised nature of work. We examine broader forms of collectivism for these workers, drawing on survey and interview data. Our focus is on social class, attitudes towards unions and professional bodies and participation in the broader ICT community - specifically Free, Libre and Open Source Software (FLOSS). The findings reveal absence of formal collective frames of reference or organisation, yet the creativity, autonomy and initiative, central to the identity of ICT workers, may offer opportunities for collectivisation particularly when we look at participation in FLOSS communities.

Key words: Collectivism, ICT Workers, Class, Unions, Open Source Software

Introduction

Debates about collectivism have traditionally focused on issues of trade union membership and the decline in most forms of tangible collectivism. However, recent work has tried to look beyond simplistic understandings of trade union membership as an articulation of collective frames of reference. For example, McBride and Martinez

Lucio (2011) argue that most perspectives on the decline in collectivism fail to acknowledge broader social experiences and occupational memories - factors that may help locate some sense of extant collectivism. Yet, not all occupational groups have a long-term history where such memories can be exploited.

There were 1.75m people working in the Information and Communication Technology (ICT) sector in 2015 (Tech Partnership, 2016), yet this contemporary group of workers have limited recollections to draw upon and when it comes to potential for collectivism, ICT work is often cited as highly individualistic labour, typified by low levels of trade union membership and equally low levels of membership of professional organisations (Author One et al., 2004).

Indeed, ICT workers present a particularly interesting group of workers in terms of their attitudes towards unions. They are embedded within the body of employees labelled as 'knowledge workers', indicating that they may hold a substantial degree of influence due to their proximity to, and connection with, electronic means of production with web based media, potentially, a useful tool for organizing union activities (Fiorito and Bass, 2002; Diamond and Freeman, 2002). Yet, there is little evidence that ICT workers are predisposed to join unions (Milton, 2003). Kinnear and Sutherland (2000) argue that

knowledge workers more broadly, hold highly individualistic identities and this challenges any sense of solidarity or collective engagement. At the same time though, ICT workers are known to engage in online communities, often underpinning ICT augmentation through participation in specialist development groups. Contributing to what is known of as 'free, libre and open source software' (FLOSS), these communities represent a collective activity, separate from the workplace, but one that is related in terms of being industry and knowledge-specific.

Based on an online survey and 29 interviews with ICT professionals under the age of 40, this article examines the social backgrounds, demographic composition and attitudes towards unions, professional bodies and perceptions of social class, in addition to online presence, to try to understand whether there is any evidence of collectivism in this 'new knowledge elite'. This paper has two main functions: first, to supplement the existing literature on the collectivisation of knowledge workers (e.g. Lücking and Pernicka, 2009) and second, to contribute to the growing body of work on virtual spaces as organising forums (e.g. Cohen and Richards, 2015; Upchurch and Grassman, 2015). Unlike other work in the field (e.g. Hodder and Houghton, 2015; Saundry et al., 2007), we do not focus on how the Internet may be used by unions, rather we are concerned with the virtual realm as a facilitator of collective behaviour.

This paper starts with a review of the literature on the dynamics of collectivism, followed by a discussion of the role of the Internet in trade union membership and activity. The subsequent section presents the context of the ICT sector followed by a methodology section. The analysis of the data broadly follows from the discussions in the literature review. We finish our data presentation with an examination of participation in online communities based around FLOSS and their role in collectivising ICT workers. This paper concludes that there are potential opportunities for collectivism building on existing groupings within FLOSS communities.

The Dynamics of Collectivism

Collectivism and worker solidarity, have their roots in the industrial revolution. D'Art and Turner note that as well as interests, solidarity is formed via 'a strong sense of identity, attachment and allegiance' (2008: 11) centred on an occupational community which protects workers against authority and advances group interests in the workplace and in wider society (D'Art and Turner, 2008: 13). Traditionally, solidarity has been formally organised through representative bodies such as trade unions and professional associations. However social class and political affiliation have also provided the bases of solidarity. Gumbrell-McCormick and Hyman (2015:2 italics in original), note that there is an important distinction to be made between 'solidarity *with* and solidarity

against'. They go on to say 'as collective identities have become far more diffuse, and employee interests far more differentiated', class solidarity is less apparent (Gumbrell-McCormick and Hyman 2015:2). Class solidarity maybe disrupted by identity conflict where, for example, social class and occupation are mismatched (Savage, 2015).

Alongside the tendency for people to disidentify with the working class (Savage, 2015), worker collectivism has also seen a decline. Rapid decline in formal avenues of collective worker representation via trade unionism is well established within the literature (D'Art and Turner, 2008). Explanations range from deliberate political and managerial attempts to dismantle trade unionism and weaken worker power, to difficulties in reconciling trade union and worker interests - given heightened heterogeneity in the workforce and the shift to service work - to fragmentation of collectivism in society more generally (D'Art and Turner, 2008; Gumbrell-McCormick and Hyman 2015). Within the UK context of individualized and unitarist employment relations, reconfigured representational channels have replaced trade union voice with a variety of mechanisms and practices that are resolutely arranged on management's terms and largely related to workplace issues (Donaghey et al., 2011). The pessimistic view of formal collectivism is placed between the rock of apathy and the hard place of antipathy as the cult of the individual reigns supreme (Peetz, 2010). Professional associations too, have been

criticized for neglecting the interests of the majority of their members in favour of an elite, successful few (Freidson, 1994), adding weight to an overall disinterest in formal representation at all levels in the occupational hierarchy. Danford et al (2014) also found that professional workers expressed disaffection with their unions' lack of independence from management suggesting that these workers expect action from their unions and that unions will be held to account by professional workers. Unsurprisingly, the focus of research on the possible responses to the decline of trade unionism has been to analyse sources of union commitment and ways in which union renewal might be achieved (see Gall and Fiorito, 2012). Active participation and commitment to trade unionism as an ideology is seen as key to revitalizing collective organization. However, 'the new economy' has proved challenging to union organisers, given no tradition of unionism and individualized employment relationships, which require greater financial and human investment in campaigning (Gall, 2005).

In order to understand collectivism in newer occupations, debates on collectivism have moved beyond a limited analysis of formal avenues of membership and workplace grievances, to examine broader issues associated with occupational identity including, for example, labour market position and perceived class identity (McBride and Martinez Lucio, 2011). Indeed, Gall and Fiorito (2011) argue that class is actually the absent facet

in discussions about union organizing. Contemporary arguments place a strong emphasis on material interests and workplace solidarity, but often omit broader solidarities and identities that extend beyond the workplace. This point is developed by Simms (2012), who suggests that with the increasing heterogeneity of British workers in terms of demographic composition - as well as contractual status and occupational position - the trade union movement would be better served by focusing on solidarities that pursue the interests of workers as a class *for itself* (99).

MacKenzie et al (2006), in work on redundant steelworkers, found that despite no longer working in a traditional working-class occupation, collectivism was intrinsic to participants' identity. This collectivism was premised on a sense of occupational community which extended to an awareness of class identity and solidarity and included an articulation of a shared perception of problems in common with workers elsewhere. Within a Scottish context Author One et al. (2009) found that (objectively) middle-class software professionals proffered a working class identity based on a sense of nostalgic attachment to collective values that were associated with the community in which they resided, as well as their parent's occupation.

Author One et al.'s finding may hint at the fact that knowledge workers are not as unambiguously individualistic as writers such as Kinnear and Sutherland (2000) suggest

- a point supported by Hyman (1999) who notes that the frequently quoted tenet that workers are becoming increasingly individualistic collapses due to the simple fact that individualistic orientations have always existed. As Martinez Lucio and Stewart (1997) argue, individual and collective struggles are usually intertwined, with individual tensions being a foundation for solidarity and mobilisation. Indeed, Taylor and Moore (2015: 94) vividly portray how cabin crew who might at first appear 'unpromising collective actors, fragmented by multiple identities and transient workplaces' overcame these apparent barriers to conduct successful industrial action. The union was able to transform individual dissatisfactions with work into a collective perception of commodification, suggesting that even groups of workers that do have individualistic orientations can be collectivised.

The foregoing raises questions on whether ICT workers share any of the collective attachments displayed by other 'so called' individualistic workers. For example, do ICT workers locate themselves within any particular social class and could class solidarity be exploited for the purpose of collectivisation or mobilisation? Importantly too, if ICT workers are to collectivise, what forms of organisation would they be amenable to? With previous literature suggesting the ambivalence of ICT workers toward professional organisations and trade unions (e.g., Author One et al., 2004), are there other forms of collectivism available?

Collectivising and the Internet

The recent work on the British Airways dispute (Taylor and Moore, 2015) examined the use of Internet forums to mobilise employees. Indeed, the extent to which the Internet can be utilised to boost and stimulate trade union renewal has been hotly debated over the past fifteen years (e.g. Diamond and Freeman, 2002; Panagiotopoulos, 2012).

There are writers such as Aalto-Matturi (2005) and Diamond and Freeman (2002), who argue that the web presents opportunities for unions to revitalise, communicate more effectively with their members, and access groups that have previously been resistant to union involvement. Research by Bimber (1998) and McBride and Stirling (2014) have found that the Internet can contribute to trade union activity via the development of issue-focused groups and protest networks. For Upchurch and Grassman (2015), in their study of social media usage during the BA dispute, the Internet represented a source of collective support and mobilisation – yet one that needed to be rooted in traditional trade union activity.

On the other hand, Kraut et al. (1998) suggest that the Internet presents decreased interaction with real social networks which, when translated into potential interaction

with unions, leads to loose ties with it as a representative body and limits contact to that of service provision (Johnson and Jarley, 2005). Even when unions use new technologies such as social media, it has been observed that they do not make full use of them, instead tending to focus on traditional, one-way informational posts (Hodder and Houghton, 2015).

However, McBride and Martinez Lucio (2011) and Jarley (2005), identify that the dispersion of employees and fragmentation of worker interests has not really been encompassed by new union strategies, meaning that collective action is difficult to undertake due to the gap between union organising approaches and worker interests. It can be argued that it is not that the Internet necessarily depersonalises the relationship between the individual and the union, it may be that unions have failed to exploit the potential of the Internet for collective action. Over a decade ago, Freeman and Rogers (2002) argued that unions should model themselves on open source technologies, where online collaboration and sharing of resources offer a means of increasing union membership regardless of industry and geographic distance. Yet despite optimistic assessments, most recent research points to the Internet, and particularly social media, as a medium for collective, but non-union, activity.

It is true that Internet forums or online communities use new communication technologies to enable groups of individuals to meet virtually and pursue shared interests, despite being dispersed by time and space (Faraj et al., 2015; Richards, 2011). Cohen and Richards (2015) examined the use of Facebook by workers within a large anti-union retailer. Within Cohen and Richards' study, workers used a Facebook group as a 'community of coping' (Korczynski, 2003) to offer emotional support and to organise forms of resistance with other employees of the company nationwide – collective engagement more resonant of traditional union activities.

Saundry et al.'s (2007) research on freelance workers in the audio-visual industry found that many of these workers used Internet-based virtual networks to share problems and experiences. Whilst these Internet forums provide useful vehicles for exchanging ideas, Saundry et al. found the networks were limited to 'discussion forums' and fail to provide an alternative to more traditional forms of unionisation. The workers in Saundry et al.'s study are freelancers though, a group of workers who have always been difficult to collectivise.

Whilst ICT workers are difficult to attract to trade union membership, such workers have a unique relationship with Internet technology that could offer opportunities to

collectivise with or without unions. For ICT workers, detailed engagement with online resources is central to the day-to-day reality of their work and non-work lives. Spaeth et al. (2008) looked at the conditions required to mobilise computer programmers to contribute to knowledge production in open source software projects. While this clearly involves a very different type of mobilisation to that required for collective representative action, it provides some indication of the possible motivators for solidarity amongst ICT workers. Spaeth et al. found that:

‘open source software development mobilises the knowledge, time and effort of programmers to produce new and innovative software. Communal resources emerge during the production process of this public good as a by-product through the collective interaction of project contributors and developers during the development process’ (17).

Reputation, control over technology and learning opportunities were explanations for involvement in communal resources. Hyman (1999) argues that the desire to work for the collective good is a key motivator for individuals participating in trade unions. With open source software, similar motivations exist. The umbrella term FLOSS – Free, Libre and Open Source Software – covers a variety of different forms of software and

programming languages, all with a number of different licencing options. Though FLOSS software is most often associated with the term 'free', the term is better associated with 'freedom'.

The history of open source software development has been characterised by resisting curtailments on the 'freedom' of coding through the imposition and exploitation of copyrights by corporations (Rigi, 2013; Stallman, 2002). Such curtailments on freedom are seen within the open source movement as stifling innovation and restricted the development of improvements to software (Moore and Taylor, 2009). Open source's rise in popularity in programming is contrasted with the previous dominance of companies like Microsoft who operated 'closed-source' software. The FLOSS community allows for the development of programming languages together, allowing for the development of use-value that is protected by public licenses that enshrine the community ownership of code (Bauwens, 2005). Depending on the various forms of licenses that exist (e.g., Creative commons, GNU public licenses – see Lessig, 2001, 2004) individuals are free to use and develop the software within their employment, but are often required to share any developments or improvements to the programming languages with the community when the software is distributed publically. FLOSS development has been argued to operate like a 'gift economy' parallel to the 'real'

economy (Orsi, 2009). While likened to a gift economy, the established sociological literature on gifts places an emphasis on reciprocation. In contrast, open source development requires very little reciprocation in order to continue functioning (Elder-Vass, 2015). The essentially free labour provided by members of these communities and the low marginal costs of informational data mean that distribution costs are very near zero and developments can be supported by the 'gifts' of a small number of contributors.

Figures cited by Elder-Vass (2015) estimate the costs of building and distributing the open source Linux operating system, around a traditional commercial development, would be \$10.8bn. So, while these FLOSS communities are organised around websites (e.g., Sourceforge.net), Internet Relay Chats (IRC), social media and more specialised forums, they essentially provide the 'means of production' for a large number of employees worldwide. The FLOSS communities are able to offer documentation, advice and often skills development opportunities for anyone with an interest in the software.

Recent debate has centred on whether FLOSS and peer-to-peer networks represent a future post-capitalist form of work (e.g., Mason, 2015), or whether commons-based production will eventually be subsumed into new forms of capitalist production

(Kostakis and Bauwens, 2014). The question within this paper is, whether open source forums or other online communities can lead to forms of collective action for ICT workers? Hyman (1999) argues that 'modern information technology can offer the potential for labour movements to break out of the iron cage which for so long has trapped them in organizational structure which mimic those of capital' (29-30). Hence, we are interested in taking a step-by-step approach to the examination of whether the Internet can play a role in any other form of social movement for ICT workers and whether electronic networks can be translated into representative fora.

The Industrial Context

In the UK, 1.75 million people are employed in Information Technology and Telecoms, 63 per cent of whom are employed in technology businesses and 14 per cent are self-employed (Tech Partnership 2016). Technical workers tend to be more highly educated than other workers, and the gross weekly earnings are 37 per cent higher than the all industry average (Tech Partnership 2016). The number of people working in the ICT sector has gradually increased over the last ten years. Importantly, the nature of ICT work has also changed during this period. The burst of the dot.com bubble, in addition to the trend towards global outsourcing, mean that ICT work is increasingly precarious. Within Europe, the characteristics of the people working in the sector has changed over

the last decade. This is a slowly aging group of workers, with 63 per cent of ICT specialists in the EU-28 being over the age of 35, having increased by 6 percentage points between 2005 and 2014 (Eurostat, 2016).

In a review of European trends on union revitalization, Visser (2002: 425) suggested that there would be a further decline in union density if there is a failure to appeal to 'new workers' in the contemporary economy. Workers within the ICT sector are an ideal case, demonstrating a scenario where there has been little evidence of growth or opportunities for unions to make in-roads (e.g. Author One et al., 2004). Ewalt (2001: 93) notes that, 'Unions are rare in high-tech businesses and non-existent in dot.coms'. In North America, less than two per cent of high tech workers are unionised (Milton, 2003) and in the UK, estimates of membership vary from five to ten per cent (Author One et al., 2004).

Previous research on the ICT sector (e.g. Milton, 2003) suggests that with most employees being satisfied with their employment and existing communication channels, as well as a lack of requirement for additional benefits, that there is little space for unions to recruit. Author One et al. (2004) proposed that with stable employment and promoted posts becoming less common, there could be an opportunity for unionisation of the sector. But as Gall (2005) indicates, even with a threat to their material conditions,

joining a trade union maybe difficult as the costs of organising 'new economy' jobs is potentially high. The sites on which 'new economy' jobs, such as ICT workers operate are frequently 'greenfield or young in age, and in sectors with no significant union presence or tradition of collective bargaining' (Gall, 2005: 210).

Methodology

The participants in this research were ICT professionals (under the age of 40). ICT professionals are an ever-expanding group of workers who have limited experience of trade unions. However, within the ICT sector, younger workers are a decreasing proportion of the labour force and subject to a more precarious employment situation – and thus may be more open to independent representation (Eurostat, 2016; Howcroft and Richardson, 2008). Research indicates that workers under the age of 40 are no more negative towards trade unions than their older counterparts, yet manage problems at work by changing jobs rather than tackling problems head on (Visser, 2006; Tailby and Pollert, 2011). With an increasingly tight labour market, this solution is becoming a less realistic option though.

This study involved a two phase mixed methods approach. First, a survey was administered to ICT professionals using a database compiled by *E-skills*¹, the UK's industry body for the ICT sector. This Phase One data was collected towards the end of 2011 and the start of 2012. The survey was designed to elicit both quantitative information and qualitative data, the latter via the use of open-ended questions requiring brief narrative responses. The rationale for the mixed methods approach is based on the exploratory nature of the research (Cassel and Symon, 1994). Phase One was intended to provide initial scoping information and identify emergent themes with which to inform Phase Two. Phase Two of the research utilised semi-structured interviews with ICT professionals in order further explore key issues identified in the first stage of the research. The second stage of the research was undertaken between the end of 2012 and the start of 2014.

Phase One

A survey focused on the experiences and perceptions of working in the ICT sector, was distributed by email to 354 individuals who had participated in the *E-skills* internship scheme between 2009 and 2011 and then moved onto full-time employment. The *E-skills* internship database was considered to be an effective way of accessing young ICT

¹ E-skills is now called 'The Tech Partnership'

professionals. The *E-skills* internship programme managed placements for university students (of up to a year) for the purpose of enhancing IT graduates' employability. Participants in the scheme graduated from universities in England and Wales.

While there is no claim that the sample used for this study was representative, the occupations inhabited by the participants cover many of the categories of ICT work used by *E-skills* (2013) when describing the information economy. These include Information Technology (IT), IT specialist managers, IT project and programme managers, IT business analysts, architects and systems designers, programmers and software development professionals, Web design and development professionals, information technology and telecommunications professionals, IT operations technicians, IT user support technicians, telecommunications engineers and IT engineers.

The online survey was emailed at least six months after the completion of participants' degree education. Fifty-eight emails were returned as a result of invalid addresses, resulting in an initial dataset of 296 participants. Reflecting a response rate of 15.5 per cent, 46 people returned the completed survey. By gender and size of employer, the survey participants are broadly representative of the IT industry since 80 per cent of the respondents were male (compared with an industry figure of 79 per cent (*E-skills*, 2013))

and the majority worked in a large organisation (whilst most ICT businesses are SMEs, the majority of ICT professionals actually operate within larger businesses (*E-skills*, 2013)). Further information about the survey respondents is provided in Table One. The information and broad themes that emerged from the survey were used to inform and shape Phase Two of the research.

The most detailed information from the survey emerged from the open-ended questions. This included responses to questions about experience of working in IT, awareness and engagement with industry bodies and trades unions, and career plans.

Insert Table One about here

Phase Two

Phase Two of the study involved in-depth interviews with 29 ICT professionals. Of these, eight were sourced from the Phase One *E-skills* survey and 21 were sourced via a small convenience sample of industry contacts and snowballing from the original eight contacts. The reason for the mixed sampling approach was two-fold. First, the eight follow-up interviews from Phase One were used to verify interpretation of the brief narrative responses afforded by the survey. Second, when themes from the initial eight

were confirmed, the 21 interviews with individuals sourced from elsewhere were used to supplement Phase Two by contributing wider testimony and perspective. In particular, the centrality of open source software forums to potential collectivism was explored with relevant employees. While it is maintained that the *E-skills* internship database was a good starting point in terms of accessing variety of experiences, it also comprises only those who were in the first few of years of their careers and had all undertaken the same internship programme, an experience that might in some way bias perspective. To access the wider IT professional experience for younger workers it was appropriate to source participants from elsewhere. In total, the participants in Phase Two worked in sixteen different organisations.

Semi-structured interviews of around an hour each were conducted face-to-face (11) or by telephone between 2012 and 2014 (18). Summary information describing Phase Two participants is provided in Table Two. The interviews followed a clear structure but also allowed for information to emerge through conversation. Interviews were recorded and transcribed verbatim. NVivo was used to code the interview transcripts and the analysis was conducted independently by three of the researchers to the point of theoretical data saturation. The finalised code structure was then applied to the data with two members of the research team re-review all the data and independently applying the

codes from the finalized code structure. The full team then reviewed discrepancies and negotiated consensus (Miles et al., 2014).

Insert Table Two about here

Findings

The analysis begins by establishing attitudes towards formal, extant avenues of collective representation before examining the opportunities for collectivism arising from traditional social class membership. In the third section analysis focuses on a nascent form of collectivism, the online community.

ICT Workers and Membership of Trade Unions and Professional Bodies

Over half the survey participants felt that independent representation is important for ICT professionals (51.16%), yet less than 20% of the survey respondents were members of a trade union (17.39%)² and only one of the interviewees was a union member. This participant had joined the GMB when working for BAE systems (a heavily unionised

² This is a higher percentage than other research has identified and likely to be due the relatively small sample size. The same proportion of union members were not identified in the group of interview participants.

organisation) and had retained his membership ever since. This overwhelming majority not being unionised however, is typical of the relatively individualistic orientations to work of white-collar technical workers, operating within loose organizational bureaucracies (Author One et al., 2004), suggesting that ICT workers are not against trade unions per se, although they may have a perception of divided loyalties.

A number of the interview participants indicated that they were not members of a union as it would be 'unfaithful' to the company. The quote below is characteristic,

'(joining a union) would be disloyal and it's not fair ... I think it's unfair to go to somebody else before you approach the person' (Ron)

This quote demonstrates a high trust relationship with the employing organisation and a form of collectivism that involves the internalisation of a managerial agenda, apparently dismissive of the benefits of independent representation (Donaghey et al., 2011).

And yet the survey results (Table One), demonstrate that ideologically this group of workers are not antagonistic to collective action or the principles underpinning the trade union movement, with just over half of survey participants stating that they believe that independent representation is important. One participant defines himself as a socialist

and many others, when interviewed, stated that they believed that unions are a 'good thing' - but just not for them. This maybe because the flat hierarchies of most of their workplaces mean that employees have direct access to management (Milton, 2003).

'I don't feel as if I need to be (a member of a union). If I have a problem with my management I'll go and speak to them about it. That's always been the result I need.... All the miners' strikes and everything in the earlier eighties and late seventies. I don't want to feel like that' (Alex)

As demonstrated in the quote above, at least half the participants cited examples of industrial conflict when explaining why they do not want to join a union. There was frequent mention of the miners' strike - a touchstone industrial dispute that looms large in people's understandings of organized labour. Many mentioned that unions are for 'factory workers' and not for professionals. There is a possibility that with the increasing image of professionalization by engineering and associated occupations that participants want to disassociate themselves with engineering's more blue-collar origins. This confused structural position has been documented elsewhere (Smith and Meiskins, 1995).

There was common reference to independence and personal initiative, factors that are also identified as important to ICT workers and perceived by our participants as being contradictory to trade union membership. The perception that trade unions impact on creativity and autonomy was also identified by Milton (2003) in his research on technical workers. This notion of independence and personal initiative was valued by many of our participants as the quote below demonstrates. The question is whether this notion mitigates a sense of collective responsibility? As Martinez Lucio and Stewart (1997) identify most workers are involved in both collective and individual struggles and the two are frequently interwoven.

'To be honest with you, I wouldn't know what trade union a software developer like me could join. I mean that's just education within the community. Like within the profession, no one really talks about trade unions ever. I mean, I know about the TUC and stuff like that because it is in the news but that is just for teachers. We don't, or at least I don't know that we have a trade union as such' (Julie)

Other factors that participants cited for not joining a trade union included satisfaction with pay and poor visibility of unions within the sector, as well as lack of education about

potential representation both at University and within the broader professional community.

There was one participant who had a good understanding of trade union activity and had experience of trade union membership from his country of birth (Denmark). He had some interesting insights as to how a collective body can represent individuals. He argued that Danish representation of IT workers was based on an understanding of individualistic orientations to work and therefore was successful within the sector.

I'm very much involved in the Danish Union though, IT Workers it's very much based on single individuals and their own success. The Union is really visible in the IT sector [in Denmark] and they've been having some great struggles with international firms who try to get rid of the special labour agreement. ... There was a big, big dispute that ended in a walk out and strike from many, many workers in Denmark, but it actually ended quite badly for the Union. They lost the argument in.... So they had to pull off the strike and it was very costly for them so it's not looking too good for the Unions at the moment. ...I just think that Unions are the only solution to make sure that we don't repeat all the bad things we saw in the industrial age of employers

abusing employees but I guess as long as the IT sector's so successful as it is now, people just get a new job really.'

It is frequently argued that one of the reasons that professional employees do not join a union is that they hold membership of professional bodies, and these institutions satisfy some of their need for representation (Eaton et al., 2004). However, both our survey and interview findings indicate relatively low levels of membership of professional bodies. The survey showed that only 39% of participants held membership of the British Computing Society (BCS) or an equivalent professional body, despite 57% stating that professional bodies were important.

Those few participants who were members of professional bodies referred to their involvement (typically the BCS) as enhancing professional status and maintaining standards within the occupation, for example, *'keeping IT to a professional standard is important for the sector to stay viable'* (Male, 18-24), or professional membership being a requirement for employment.

Some participants argued that professional bodies were useful for networking and keeping up-to-date with activities and movement within the sector. Comments along these lines included *'it can help improve knowledge and contacts'* (Male, 18-24). Many of those who retained membership of the BCS, had joined as undergraduates to enhance

job prospects. However, the majority of comments, particularly from the interviews were rather cynical about professional membership. For example, *'I don't know anybody who is a member of the BCS. I've never met a person who has as good word to say about it. It's like an absurd kind of caricature of everything that's bad with computing'* (Ryan).

As well as a belief that there is little that a professional body can do to benefit employees, the structure of the profession means that representative bodies were perceived as providing no real benefit to workers in terms of professional advancement.

'The BCS does not promote innovation or modern software development at all in the UK. I mean, their stated aim is to be the equivalent of the General Medical Council for software. And, there are days I can sympathise with that, but overall no. The BCS belongs to a bygone age. It was outdated when it was first founded and nothing's changed since then.' (Sam)

While there appears to be no significant inclination to join professional bodies, the participants often have an attachment to, or rather identity with, their occupational group. In fact, Elliot states that his identity with the profession is so strong he said *'money perhaps isn't the primary motivation in this job because you know, you are doing it to a certain extent as a vocation'*. Congruent with traditional positions on social

identity, a number of participants talked about their occupation and their work as an extension of themselves. As Mark, notes, *'I'm in the office from about nine 'til about six, then about ten 'til two at night. . What I do is part of who I am .. it's good.. a big part of me'*

It is therefore clear that this group of workers, regardless of any attitude to formal collectivism, strongly identify with their occupation.

ICT Workers and Social Class

The previous section reported a lukewarm collective orientation for these ICT workers – at least in terms of trade union membership or membership of professional bodies. Yet, there is not antipathy to collectivism per se. As noted previously, McBride and Martinez Lucio (2011) believe that historical occupational groupings can provide a social memory that locates a collective reference point for a community. Furthermore, the work on 'nostalgia' is of particular relevance here. Strangleman (2012) argues that the critical assessment of 'memory around occupational community' can provide useful perspectives on industrial and social change. Earlier research indicates that many ICT workers come from households that are traditionally working class with parents that come from technical occupations (Milton, 2003; Author One et al. 2009). It is important

to understand whether the background of the workers in the current study impacts on their broader attitudes towards work.

Indeed, nostalgia and industrial memory did play a part for a minority of participants. A few articulated their social class in terms of their parents' occupations. Many others acknowledged that their parents were active within the trade union movement. For example, Gary, who self-identified as working class noted,

'My dad is a trade union member. He's an electrician. My mum's retired now – she was at BT, something to do with Sales and Marketing within BT and kind of new schemes, tariffs and promotions of some sort'

The majority of survey participants originated from families occupying lower managerial or technical roles. This is consistent with the findings of Kelsall et al. (1972) and Van de Werfhorst et al. (2003) who found that children of technical workers were more likely to enter technical roles themselves. However, the vast majority self-identified with the middle strata, with 65.91% of survey respondents identifying themselves as middle class, 2.27% stating that they are upper class and 31.82% identifying themselves as working class. For the most part, both the survey findings and the interviews indicate

that individuals' class identity was a reflection of their lifestyles and their living and consumption patterns despite their heritage being from working class technical communities

'I'd say software development is quite middle class because it tends to be nerdy, white kids in their room on the computer doing stuff rather than, you know, if you're upper class you might have better things to do. So I mean pretty much everyone that I know tends to be middle class' (Pierre)

The participants had a clear understanding of social stratification and a sense of their own class identity. Yet, as evidenced in earlier sections, even those that have an awareness of trade union activities or who have family members associated with industrial communities do not appear to have translated this into their own opportunities for membership of representative organisations nor any sense of any work-based collective identity. This is distinct to earlier research which found strong evidence of industrial heritage impacting on class identity and in turn positive perceptions of trade unions (Author One et al, 2009). Savage (2015), however, notes that in contemporary society class definitions and identities are more fluid, value-laden with boundaries redrawn by the privileging of technical expertise. These workers are

keen to ally themselves with high level technical expertise, something that they see as congruent with being middle class.

One of the factors that has influenced change in contemporary life is the widespread use of the Internet and particularly, social media. Social media provides a mechanism for developing communities and in turn identities. The role of the Internet in contemporary life has to a large extent separated younger workers from their parents' generation and in all likelihood separated them from the artefacts that created the identities of previous generations (Schmalz et al., 2014).

Collectivism and Participation in FLOSS Communities

As discussed above, there was limited evidence of trade union membership by ICT workers, hence, it is impossible to make claims about the use of the Internet by trade unions for ICT workers. All that can be ascertained is the extent to which ICT workers use the Internet for collective/representative activities. During interviews, when asked about their engagement with the Internet for collaborative activities, many participants cited their use of FLOSS-based communities.

Open source software is software where the source code is available for modification or improvement by anyone. Programmers can improve a program by adding features to it or fixing elements that require development. As a result of the democratic principles behind open source software, numerous online discussion forums and communities have developed around programming languages and projects.

Individuals' relationships with the actual programming languages, were seen as being relatively instrumental, 'the language is just a tool, it's like a brand of hammer' (Mitch). Yet, the feeling of community, central to open source activity, was really important to most of our participants. Mitch later explained that

The communities that I'm involved in support my work so they support my occupation. I could have my occupation without these communities but it would be more difficult I think. I wouldn't have progressed to the point where I am without them. (Mitch)

While we noted earlier that some writers have argued that the Internet depersonalises relationships between the individual and the union (Brown and Jarley, 2005), participants in this study discussed how they developed personal and 'real' interaction from the virtual domain. At least five participants discussed involvement in locally

arranged 'meet ups'. One participant compared these 'meet ups' with the formal events arranged by professional bodies. Participants made a very clear link between open source communities and professional bodies (specifically the BCS) with Lisa going as far as saying that the open source communities 'are my professional body'. Julie, for example, explained why she perceived an open source community to be of greater value than membership of a professional body.

'The BCS seem very academic .. and they are quite formal. And this is something I found very odd, because at the end of the BCS event that I went to, they had like three people on stage, two people were on talks and a kind of host person. It was really formal, and I was like, oh gosh is this what I miss? Cos I'm glad I miss it. Whereas the open source community is a lot more informal, it's a lot more like let's go have a discussion down at the pub kind of thing. And that's so much more fun, and that's definitely what kind of person I am I guess. I just suit it better' (Julie)

The position of the participants mirrors findings from Milton's (2003) research which proposes that high tech workers do not engage in traditional forms of collectivism as professional bodies and trade unions contradict ICT workers' creative and autonomous

sense of self. Yet, these open source communities seem to fulfil some of the roles typically undertaken by professional bodies in terms of creation of a collective professional identity and providing routes to learning and professional development but also feed ICT workers sense of creativity.

'[My] open source activities are really how I have continued my professional development in a field that isn't what I'm originally qualified for. So I've had mentors through the open source community – both formal and informal. I get a lot of technical support...so because I know everybody, I know whose brain to pick quickly if I have a problem at work. I...so that's really helped to kind of increase my skills and put me in touch with a peer group that is better than me and sort of helps me to keep learning to keep up with them. That's been really, really important.' (Lisa)

Whilst Saundry et al. (2007) argued that Internet forums can provide a sense of collective identity but fail to replace traditional forms of union representation, the current research found that FLOSS-based communities *do* replace some of the activities that are traditionally undertaken by trade unions. There were a number of examples where participants sought advice and support from FLOSS groups. One notable example is where Julie had experienced a problem with bullying at work and found support

though an online community. This support enabled her to navigate her way through her difficulties. In another time and occupation, this type of support might have been accessed through a trade union.

'Without the PHP community I wouldn't have my job. I had an incident where I was harassed quite badly and I was ready to give up. I was ready to give up on the job and the industry... And it was because of the community that I stayed on. They really supported me through the toughness that I was going through. And I'm really thankful to them for that. And I guess that's why I have an obligation to give back what I took from the community and support other people whether that is becoming better developers or through their hard times' (Julie)

The participants who engaged in open source work, all acknowledged that to some extent, they owe their career to open source software and the interlinked communities. While theorists such as Bauwens (2005) and Elder-Vass (2015) acknowledge that open source, and peer-to-peer software in general, does not require reciprocation to function, the findings here show that the participants all acknowledge some obligation to 'pay back' to the communities. Furthermore, the experiences of Julie and the other interviewees also reflect the 'communities of coping' observed within Cohen and

Richards' (2015) study of Facebook group usage in an anti-union retailer. Yet, unlike their study, our participants suggest that FLOSS communities, couple emotional support with the skills development integral to open source work. Indeed, FLOSS's online communities offered some of the participants the opportunity to develop the skills required for their initial access to employment. Over and above previous studies of Internet usage and collectivism, the social networking used by FLOSS developers is inextricably tied to their labour process.

Conclusions

The main purpose of this article was to deconstruct understandings of collectivism beyond trade union membership and associations with professional bodies and examine more informal networks for ICT workers. The paper sought to ascertain whether the taken for granted assumptions regarding the individualistic orientations of ICT professionals are supported, and furthermore, to explore whether there is any potential space for trade unions or other representative fora to operate with the ICT sector, leading to optimism for future avenues for collective action (McBride and Martinez Lucio, 2011).

The data presented in this article suggests that there is no more desire to join a union than identified in earlier studies (e.g. Author One et al., 2004). Milton (2003) has

suggested that the creative, autonomous identity of high tech workers is an explanation for (lack of) collective behaviour subsequently used as a rationale for the lack of propensity to join a union. Knowledge work that is predicated on technical expertise as a source of labour market and organisational power is not amenable to sharing that the ideology of collectivism would require. However, there is a certain complexity and indeed, contradiction that has emerged from the data collected for this article. In keeping with other research, creativity is seen as a central part of identity, as is autonomy and the use of initiative. Professional identity is viewed as important but not central to employees' sense of self and does not necessarily predispose ICT workers to join a professional body. It appears that neither professional bodies, nor trade unions, provide an appropriate avenue for ICT workers to feel represented. For many, there is a lack of conviction that formal collective organisation can make a difference. Apathy towards formal collectivism via trade unions or professional bodies seems to stem from participants' sense that these bodies are 'outdated' or unable to represent them in any meaningful way. Bargaining takes place at an individual level and this direct and open communication with management, at least superficially, appears to secure loyalty.

There is thus, a lack of formal collective organisation through which ICT workers can express discontent and yet, these workers are not immune to traditional workplace disputes associated with issues such as pay, training and conditions of employment;

instead it appears that there is confusion about the services that unions. With an absence of role models or examples of successful trade union action in newer occupational groups, not only will representation be hard to achieve but ICT workers tend to understand union activity in terms of high profile media accounts in blue collar work, which further alienates them from the trade union movement. These outdated conceptions of union activity and salience are a continued problem for unions in 'the new economy' (Gall 2005).

Even though a number of participants originated from working-class households, with families that are likely to recognise and to have participated in union activity, family history was seen as peripheral to working lives. These workers display an uneasy attitude towards class solidarity as a referent for collective activity (Simms 2012) associated with a need to see ICT work as high status.

Any attempts to mobilise ICT employees should recognise identity concerns as antecedents of, and obstacles to, unionization. A perceived image of a strong union presence may also damage employees' professional identity. As Milton (2003) states, for a somewhat different purpose, 'to have joined a union would have in many respects been tantamount to killing a dream, releasing valued identities and letting hope slip away. It would have been a behavioural statement indicating that all was not well in the

land of milk and honey' (4). Part of the damage to the dream is embedded in the self-perception of ICT workers as creative mavericks and not 'joiners' of traditional institutions. Yet, this research demonstrates that these workers do experience discontent and that they value support from others.

McBride and Stirling (2014) discussed the potential support network that the Internet can provide. Indeed, the Internet is increasingly used as a mechanism for achieving solidarity and support for workers. For groups of individuals who have little experience of trade unions, the question arises as to how to combine and coordinate the support and presence on the Internet to construct a more formal and meaningful representative forum. The empirical data presented in this paper demonstrates that FLOSS communities provide many of the support functions that a traditional union would offer. Whilst the notion of formal representation is somewhat stigmatised for this group of workers, it certainly appears that some form of representation may arise from these Internet forums and networks.

The implications of this for formal trade union involvement do not however look promising. Whilst there is clearly an appreciation of internet-based communities in assisting a sense of solidarity and support, the overall ambivalence to trade unions

would suggest that an attempts by trade unions to colonise internet spaces are unlike to reap much reward.

References

Aalto–Matturi S (2005) The Internet: The new workers' hall. The Internet and new opportunities for the Finnish trade union movement. *WorkingUSA* 8(4): 469–481.

Bauwens M (2005) The political economy of peer production, *CTheory online journal*, 1 December 2005, *accessed 11 August 2016*

Bimber B (1998) The Internet and political transformation: Populism, community, and accelerated pluralism. *Polity* 31(1): 133–160.

Cassell C and Symon G (1994) Qualitative research in work contexts. In: C Cassell and G Symon (eds.) *Qualitative methods in organizational research* (pp. 1-13). Thousand Oaks, CA: Sage Publications.

Cohen N and Richards J (2015) 'I didn't feel like I was alone anymore': evaluating self-organised employee coping practices conducted via Facebook. *New Technology, Work and Employment* 30(3): 222-236.

Danford A, Durbin S, Richardson M, Stewart P and Tailby S (2014) Workplace partnership and professional workers: 'about as useful as a chocolate teapot?' *International Journal of Human Resource Management* 25(6): 879-894.

D'Art D and Turner T (2008) 'Workers and the demand for trade unions in Europe: still a relevant social force?' *Economic and Industrial Democracy*, 29(2): 165-191.

Diamond W and Freeman R B (2002) Will Unionism Prosper in Cyber-Space? The Promise of the Internet for Employee Organisation. *British Journal of Industrial Relations* 40 (3): 569-596.

Donaghey J, Cullinane N, Dundon T and Wilkinson A (2011) Reconceptualising employee silence: problems and prognosis. *Work, Employment and Society* 25 (1): 51-67.

E-skills UK (2012) *Technology insights 2012*. Available at: <http://www.e-skills.com>.

(Accessed 24 August 2016)

e-skills UK (2013) *Adoption and Employment Trends 2012-2017*. Available at

<https://www.thetechpartnership.com/globalassets/pdfs/research->

[2013/bigdataanalytics_report_nov2013.pdf](https://www.thetechpartnership.com/globalassets/pdfs/research-2013/bigdataanalytics_report_nov2013.pdf) (Accessed 24 August 2016)

Eaton S, Saul C, Rubinstein, A and McKersie R B (2004) Building and Sustaining

Labor Management Partnerships: Recent Experiences in the U.S. *Advances in*

Industrial Relations 13:139–59.

Elder-Vass, D (2015) Free gifts and positional gifts Beyond exchangism. *European*

Journal of Social Theory 18(4): 451-468.

Eurostat (2016) ICT Specialists in Employment. Eurostat.

Ewalt D M (2001) Attacks Lead To Internet Slowdowns, InformationWeek.com,

12th September 2001. Available at

<http://www.informationweek.com/story/IWK20010912S0013> (Accessed 24 August 2016)

Faraj S, Kudaravalli S and Wasko M (2015) Leading Collaboration in Online Communities. *MIS Quarterly* 39 (2): 393-412.

Fiorito J T and Bass W (2002) The Use of Information Technology by National Unions: An Exploratory Analysis. *Industrial Relations* 41(1): 34-47.

Freidson E (1994) *Professionalism Reborn: Theory, Prophecy and Policy*. Cambridge: Polity Press.

Freeman R B and Rogers J (2002) Open source unionism. *WorkingUSA* 5(4): 8-40.

Gall G (2005) Organising Non-Union Workers as Trade Unionists in the “New Economy” in Britain. *Economic and Industrial Democracy* 26(1): 43–6.

Gall G and Fiorito J T (2011) The Backward March of Labour Halted? Or, What is to be Done with 'Union Organising'? The Cases of Britain and the USA. *Capital and Class*, 35(2): 233-251.

Gumbrell-McCormick, R. and Hyman, R (2015) International Trade Union Solidarity and the Impact of Crisis, *European Policy Analysis*, (January), (www.sieps.se/sites/default/files;20151epa%20eng%20A4%20korr7.pdf) (accessed 5 December 2016)

Hodder A and Houghton D (2015) Union use of social media: a study of the University and College Union on Twitter. *New Technology, Work and Employment* 30(3): 173-189.

Howcroft D and Richardson H (2008) Gender matters in the global outsourcing of service work. *New Technology, Work and Employment* 23(1-2): 44-60

Hyman R (1997) The future of employee representation. *British Journal of Industrial Relations* 35: 309–31.

Hyman R (1999) Imagined Solidarities: Can Trade Unions Resist Globalization in Peter Leisink (ed) *Globalization and Labour Relations*, Cheltenham: Edward Elgar.

Jarley P (2005) Unions as Social Capital: Renewal through a Return to the Logic of Mutual Aid? *Labor Studies Journal*, 29 (4): 1–26.

Johnson N B and Jarley P (2005) Unions as Social Capital: The Impact of Trade Union Youth Programmes on Young Workers' Political and Community Engagement. *Transfer* 11 (5): 605-616

Kinnear L and Sutherland M (2000) Determinants of organisational commitment amongst knowledge workers. *South African Journal of Business Management* 31(3):106- 112.

Korczynski M (2003) Communities of coping: Collective emotional labour in service work. *Organization* 10(1): 55-79.

Kostakis V and Bauwens M (2014) *Network society and future scenarios for a collaborative economy*. Basingstoke: Palgrave Macmillan.

Kraut R E, Patterson M, Lundmark V, Kiesler S, Mukhopadhyay T and Scherlis W (1998) Internet paradox: A social technology that reduces social involvement and psychological well-being? *American Psychologist* 53(9): 1017-1032.

Lessig L (2003) *The Future of Ideas*. New York: Random House

Lessig L (2005) *Free Culture: The Nature and Future of Creativity*. London: Penguin.

Lücking S and Pernicka S (2010) Knowledge work and intellectual property rights – New challenges for trade unions. *Journal of Workplace Rights* 14(3): 311–328.

MacKenzie R, Stuart M, Forde C, Greenwood I, Gardiner J and Perrett R (2006) All that is solid? Class, identity and the maintenance of a collective orientation amongst redundant steel workers. *Sociology* 40(5): 833–55.

Marks A and Baldry C (2009) Stuck in the middle with who? The class identity of knowledge workers. *Work, Employment & Society* 23(1): 49–65.

Martinez Lucio M and Stewart P (1997) The Paradox of Contemporary Labour Process Theory: The Rediscovery of Labour and the Disappearance of Collectivism. *Capital and Class* 62: 49–78.

Mason P (2015) *Postcapitalism: A Guide to our Future*. London: Allen Lane

McBride J and Martínez Lucio, M (2011) Dimensions of collectivism: occupation, community, and the increasing role of memory and personal dynamics in the debate. *Work, Employment and Society* 25 (4): 1–12.

McBride J and Stirling J (2014) Green shoots from the grass roots? The National Shop Stewards Network. *New Technology, Work and Employment* 29(1): 25-39

Miles M B, Huberman A M and Saldaña J (2014) *Methods of Predicting Qualitative data analysis: a methods sourcebook*. Thousand Oaks: Sage.

Milton L P (2003) An identity perspective on the propensity of high-tech talent to unionise. *Journal of Labour Research*, 24 (1): 31-53.

Moore P and Taylor P A (2009) Exploitation of the self in community-based software production: Workers' freedoms or firm foundations? *Capital & Class* 33(1): 99-119.

Orsi C (2009) Knowledge-Based Society, Peer Production and the Common Good. *Capital & Class* 33 (1): 31-51.

Panagiotopoulos P (2012) Towards Unions 2.0: Rethinking the audience of social media engagement. *New Technology, Work and Employment* 27 (3): 178-192.

Peetz D (2010) Are individualistic attitudes killing collectivism? *Transfer* 16(3): 383-398.

Richards J (2011) What has the internet ever done for employees? A review, map and research agenda. *Employee Relations* 34(1): 22-43.

Rigi J (2013). Peer production and Marxian communism: Contours of a new emerging mode of production. *Capital & Class*, 37(3): 397-416.

Saundry R, Antcliff V and Stuart M (2007) Broadcasting Discontent: Trade Unions, Freelancers and the Internet. *New Technology, Work and Employment* 22(2): 178-91.

Savage M (2015) *Social Class in the 21st century*. London: Random House

Scholarios D and Marks A (2004) Work life boundary, reciprocity, and attitudes to the organization, the special case of software workers. *Human Resource Management Journal* 14 (2): 54-74.

Schmalz, D L, Colistra CM and Evans, KE (2014) Social Media Sites as a Means of Coping with a Threatened Social Identity, *Leisure Sciences: An Interdisciplinary Journal*, 37 (1) 20-38.

Simms M (2012) Imagined solidarities: where is class in union organising? *Capital and Class*. February: 90 - 110.

Smith C and Meiksins P (1995) System, society and dominance effects in cross-national organisational analysis. *Work, Employment and Society* 9 (2): 241-267.

Spaeth S, Haefliger S, von Krogh G and Birgit R (2008) Communal Resources in Open Source Software Development. *Information Research* 13(1).

Stallman R (2002) *Free Software, Free Society*. Free Software Foundation

Strangleman T (2012) Picturing work in an industrial landscape. *Sociological Research Online* 17:20.

Tailby S and Pollert A (2011) Non-unionised young workers and organising the unorganised. *Economic and Industrial Democracy* 32 (3): 499-522.

Taylor P and Moore S (2015) Cabin crew collectivism: labour process and the roots of mobilisation. *Work, Employment and Society* 29 (1): 79-98.

Tech Partnership Datasheet (2016) Factsheet: Tech industry workforce (February 2016), Available at: www.thetechpartnership.com (Accessed 24 August 2016)

Upchurch M and Grassman R (2015) Striking with social media: The contested (online) terrain of workplace conflict. *Organization*. Epub ahead of print 19 August 2015. DOI: 10.1177/1350508415598248

Visser J (2002) Why fewer workers join unions in Europe. *British Journal of Industrial Relations* 40(3): 403-430.

Visser J (2006) Union membership statistics in 24 countries. Monthly Labor Review
January: 38–49.

Gender	Percentage*
Male	81
Female	14.2
Unspecified	4.8
Age	
18-24	69.8
25-39	30.2
Degree	
IT/Computer Science/Software	57%
The above plus Business and/ or Management	43%
Member of a Trade Union	
Yes	17.39%
No	82.61%
Member of a Professional Body	
Yes	39.13%
No	60.8%
Do you think that independent representation (e.g. Trade Union) is important for ICT workers?	
Yes	51.16%
No	48.84%
Do you think that membership of a professional body is important for ICT workers?	
Yes	57.14%
No	42.86%
Size of Employing Organization (by FTE)	
1-10	8.7%
11-50	17.39%
51-250	13.04%
251+	60.87%

Social Class ³	
1	0
2	26
3	47
4	8
5	8
6	11
7	0
8	0

Table One: Survey Demographics and Overview

Pseudonym	Current Job Title	Sector
Ryan	Applications Developer	Pharmaceuticals
Pierre	Games Developer	Software Development
Rick	IT Support	Manufacturing
Olivia	Client Technical Specialist	Computer Manufacturer
Richard	IT support	Local Government
Nicholas	Part-time Software Developer	Healthcare
Gary	Business Analyst	Pharmaceutical
Tom	Graduate Trainee	Pharmaceuticals
Gill	Software Engineer	Digital Media
Nathan	Software Engineer	Digital Media
Doug	Software Engineer	Digital Media
Shaun	Hardware Engineer	Digital Media
Steve	Communications Manager	Digital Media
Elliot	Software Engineer	Digital Media
Noah	Graphic Designer	Games Development

³ Social class was calculated based on the parent in the highest occupational group using NS-SEC

Ron	Computer Programmer	Games Development
Alex	Radio Frequency Engineer	Advanced Technology Design
Dean	Software Engineer	Advanced Technology Design
Alan	Systems Architect	Advanced Technology Design
Helen	Manager	Advanced Technology Design
Anthony	Software Engineer	Advanced Technology Design
John	Project Manager	Advanced Technology Design
Mark	Senior Engineer	Semi-Conductors
Rebecca	EngD Student	Semi-Conductors
Lisa	Web Developer	Freelance
Mitch	Lead Platform Developer	Broadcasting
Julie	Web Developer	Digital Media
Keith	Senior Software Developer	Operating System Development
Sam	Senior Platform Engineer	Data Analysis

Table Two: Interview Participant Details