Literature Search Results

Research question or topic: "What are the benefits to a diverse workforce in digital, data and technology teams?"
Name of person/ team requesting search: Digital Readiness Programme
Completed by: HEE Knowledge Management Team
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Contents

This material may have been compiled in response to a specific question within a given context. Results may not be generalisable or replicable.

This material may be based on rapid and pragmatic evidence reviews or evaluations, and as such, may not be systematic. Some evidence may have been overlooked, and more evidence may have been published since.

Search headlines

The benefits of diverse teams in general have been explored in previous searches and you were interested mainly in technology related team benefits, so on the whole they are not covered here. I have included a systematic review led by Department for Business, Innovation and Skills in 2014 on the busines case for equality and diversity. [1] As summarised by an Edinburgh Napier University report on Women in IT the government review "found evidence that **firms have reaped business benefits from equality and diversity**, such as **increased staff engagement and retention, and more creativity and better problem solving** due to a wider range of perspectives. Furthermore, it **widens the talent pool from which to recruit**, and firms may be **better able to adapt** to increasing consumer diversity when this diversity is also reflected in its workforce. However, the authors of the review stressed that **these benefits tend to only accrue where diversity is sufficiently well-embedded and managed**." [24] A blog post from the British Computer Society (BCS) also describes the links between diversity and business performance and inclusivity, amongst other benefits. [2] BCS also published a diversity in IT report in 2017 with some stark headlines about diversity in the sector:

"In 2016 just over one half (51%) of the population (aged 16 and above) were women, 23% were disabled, 45% were aged 50 and above and 12% were of non-white ethnicity. By comparison, just 17% of IT specialists were female, 8% were disabled, 21% were from older age groups and 17% were from ethnic minorities."[4]

I did not find many examples that mentioned the specific benefits of diversity in tech-related teams, as most talked about benefits in general, however a PWC report about Women in Tech published in 2017 included the following:

"Put simply, diversity is a business advantage. And other research studies by PwC confirm that the benefits of diversity include having a head-start when it comes to attracting the best technology talent. Indeed, our recent report – "The Female Millennial – The new era of talent" – finds that creating and supporting a diverse workforce is a prerequisite for winning the battle to attract today's top female recruits. In the study, 83% of British female millennials stated that they actively seek out employers with a strong record on diversity, equality and inclusion – and while they say employers talk about diversity, 66% do not feel opportunities are equal for all." (p. 3) [20]

The Female Millennial report mentioned above is also included in the result list. [21]

I did find lots of general articles and posts that looked at the topic of diversity in tech related roles and teams that will be of interest. I have organised them under the following headings:

- **Diversity in Tech** [1-13] including a report showing the unbalanced state of diversity among directors of UK tech companies [6], what the future of diversity in tech might be [7] and more recently an article warning about the challenges of closing the diversity gap in tech [9]
- **Age** [14-15] including a piece of research exploring what makes age diverse teams effective [14]
- **Dyspraxia and dyslexia** [16] – a resource you shared with me explaining the strengths of people with dyspraxia and dyslexia including leadership, empathy, strategy, and problem solving
- **Gender** [17-38] which made up most of the results and focused on things like closing the gender gap in IT related roles and teams, for example improving retention [18] or the barriers to women entering, staying and progressing in this sector. [24] A survey by BCS, The Chartered Institute for IT, found 45% of women working in IT believe their gender is the main barrier to getting ahead in their career [17]
- **Neurodiversity** [39-41] which includes an article about the competitive advantage of neurodiversity as told through the example of John, "a wizard in data analytics" who was unemployed for two years until he found a firm who took an alternative approach to talent [39] a research study to develop a neurodiversity-smart HR framework [40] and work CIPD have done on embracing neurodiversity in the workplace [41]
- **Persons with disabilities** [42] including a literature review from 2002 on the employment of persons with disabilities in information technology jobs

- **Race and ethnicity** [43-45] – researchers examined relations among ethnicity, gender, IT self-efficacy, occupational stereotypes, attitudes towards IT and IT career intentions using data from 159 African Americans and 98 Anglo Americans [45]

A complete list of the results retrieved is available in the table below.

Complete numbered list of results with links

	Citation	Abstract/ key themes	Link
Diversity			
1	The business case for equality and diversity: a survey of the academic literature January 2014, Department for Business, Innovation and Skills	This report sets out the findings from a systematic review of the literature on the business case for equality and diversity. It was commissioned by the Department for Business Innovation & Skills (BIS) and the Government Equalities Office (GEO). The report aims to: • improve understanding of theoretical positions and issues related to the business case for equality and diversity • develop a consistent framework for assessing evidence on the business case • within this framework, review the evidence • create a compendium of the evidence The research assesses the most robust evidence, draw implications from the findings and present a dispassionate picture of the evidence identifying gaps and conflicting messages. The report looks at diversity in terms of 'protected characteristics' that are defined in the Equality Act 2010. "Within the category of Approaches leading to External Business Benefits we include all policies and practices that are driven by considerations of equity and therefore all 'equality approaches' fall within this category. The assumption is that policies and practices that facilitate equality of access (to professions, levels of seniority and employment itself) based on ability, should eventually lead to workplaces that are representative of wider society18. The implication from some of the literature in section 2.1 is that, even in instances where policy	Link

		is driven by considerations other than the profit motive (such as equity or the moral case), business benefits could accrue" (see p. 12)	
2	The business case for diversity 31st January 2017, The British Computer Society (The Chartered Institute for IT)	The link between increased business performance and inclusivity is hard to deny. But to feel the benefits, organisations need to make diversity part of their DNA, writes Martin Cooper AMBCS. In the days of big data, continual improvement, relentless measurement and constant analysis, being the right thing to do does feel somehow inadequate. As part of BCS work to celebrate LGBT+ History Month, we set out to discover whether the case for encouraging and supporting diversity is more than an intuitive one. And happily, we found many forward-thinking businesses and leaders are listening to an ever-growing body of evidence that supports the inclusivity agenda. The evidence, we found, backs diversity. Solidly. The danger of similarity The idea that mono-cultures are bad for business is nothing new. Work by Harvard researcher, John Kotter, in the early nineties, demonstrated that so-called adaptive cultures dramatically outperformed non-adaptive cultures across a variety of indicators.	Link
3	Tech Talent Charter launches 2019 diversity in tech report January 2020, Tech UK	Today (15 January) the Tech Talent Charter launched its annual benchmarking report *Diversity in Tech* - tracking gender diversity in technology roles across the UK. techUK is a founding signatory of the Tech Talent Charter - a commitment by organisations to a set of undertakings that aim to deliver greater diversity in the tech workforce of the UK, one that better reflects the make-up of the population. Importantly, the Charter states that all signatories must provide data on their own workforce each year so that we can measure success and make more impactful, measurable changes as an industry for the future. Gathered from over 300 signatories representing over 700,000 employees, the data gives a snapshot of today's business and technology industry and an insight into practical ways companies can improve gender diversity in tech.	Link

4	Diversity in IT: shaping our future 2017 The British Computer Society (the Chartered Institute for IT)	Technology is by its very nature a forward-looking sector. The white heat of new inventions and innovations that transform, again and again, the way in which we live our lives. Working in a sector that is at the forefront of human progress is a privilege. But while we lead in many areas we lag in others, which is one of the reasons why it was so disheartening to see the results within the BCS 'Diversity in IT 2017: shaping our future together' report. Equality and inclusion – key facts • In 2016 just over one half (51%) of the population (aged 16 and above) were women, 23% were disabled, 45% were aged 50 and above and 12% were of non-white ethnicity. • By comparison, just 17% of IT specialists were female, 8% were disabled, 21% were from older age groups and 17% were from ethnic minorities. • Levels of inclusion in IT have improved slightly in recent years with respect to age and ethnicity though the changes mirror those within the labour market as a whole. • Whilst inclusion levels amongst those in employment tend to be lower for these groups, unemployment rates instead are seen to be higher amongst IT specialists that are disabled, older or from ethnic minority groups See also "the Diversity in IT 2017 report" and Webinar: Diversity in tech "the awkward conversation" (28th August 2020)	Link
5	Diversity in Tech	Diversity and inclusion is one of the biggest challenges facing the tech industry today. When businesses consist of people from the same backgrounds, they often leave diverse ideas and perspectives behind. Diversity in Tech is a site dedicated to helping close the diversity gap in the technology sector. The site will provide you with career advice, case studies,	Link

		jobs and employers looking to increase diversity within their companies. Whether you are a candidate looking for a new role or an employer looking to increase diversity in your company, we can help you.	
6	Diversity and inclusion in UK tech companies Tech Nation	This report sheds light on diversity and inclusion in UK tech companies We found that the state of diversity among directors of UK tech companies is unbalanced, and for the first time this research backs up with data-based findings, anecdotal reports of unrepresentative directorship. The characteristics of tech directors are correlated with the performance of their companies. We found a significant relationship between the gender of directors and company turnover, and nationality and investment raised. We attempt to unpick why this might be the case.	Link
7	The future of diversity and inclusion in tech: where the industry needs to go from here 17th June 2019, Tech Crunch	Silicon Valley is entering a new phase in its quest for diversity and inclusion in the technology industry. Some advocates call this part "the end of the beginning," Code2040 CEO Karla Monterroso tells TechCrunch. At first, advocates were focused on calling out the lack of diversity at tech conferences, pressuring companies to release diversity data and debunking the pipeline problem. Then the focus shifted to hiring heads of diversity and implementing unconscious bias training (more on this in our 'Diversity and inclusion playbook', but it's worth pointing out those things are on their own are not productive).	Link
8	Why diversity programs fail July-August 2016 Harvard Business Review	Businesses started caring a lot more about diversity after a series of high-profile lawsuits rocked the financial industry. In the late 1990s and early 2000s, Morgan Stanley shelled out $54 million—and Smith Barney and Merrill Lynch more than $100 million each—to settle sex discrimination claims. In 2007, Morgan was back at the table, facing a new class action, which cost the company $46 million. In 2013, Bank of America Merrill Lynch settled a race	Link

		discrimination suit for $160 million. Cases like these brought Merrill's total 15-year payout to nearly *half a billion* dollars.	
9	Why tech can't close the diversity gap 18th August 2020, Financial Times	A focus on hiring more people from minorities isn't enough — companies must also persuade them to stay.	Link
10	How to increase diversity in the tech sector 13th November 2019, Financial Times	Employers focus on better ways to hire wider range of people	Link
11	The diversity and disparity in biomedical informatics (DDBI) workshop 2018, Pacific Symposium in Biocomputing	The Diversity and Disparity in Biomedical Informatics (DDBI) workshop will be focused on complementary and critical issues concerned with enhancing diversity in the informatics workforce as well as diversity in patient cohorts. According to the National Institute of Minority Health and Health Disparities (NIMHD) at the NIH, diversity refers to the inclusion of the following traditionally underrepresented groups: African Americans/Blacks, Asians (>30 countries), American Indian or Alaska Native, Native Hawaiian or Other Pacific Islander, Latino or Hispanic (20 countries). Gender, culture, and socioeconomic status are also important dimensions of diversity, which may define some underrepresented groups. The under-representation of specific groups in both the biomedical informatics workforce as well as in the patient-derived data that is being used for research purposes has contributed to an ongoing disparity; these groups have not experienced equity in contributing to or benefiting from advancements in informatics research. This workshop will highlight innovative efforts to increase the pool of minority informaticians and discuss examples of informatics research that addresses the health concerns that impact minority populations. This workshop topics will provide insight into overcoming pipeline issues in the development of minority informaticians while emphasizing the importance of minority participation in health related research. The DDBI workshop will occur in two parts. Part I will discuss specific minority health &	Link

		health disparities research topics and Part II will cover discussions related to overcoming pipeline issues in the training of minority informaticians.	
12	Medical Library Association Diversity and Inclusion Task Force 2019 Survey Report July 2020, Journal of the Medical Library Association	Objective: The goal of this survey by the Medical Library Association (MLA) Diversity and Inclusion Task Force was to have a better understanding of the demographics of the association as well as ascertain how the membership feels about MLA's diversity efforts. Methods: A survey was created with the input of both task force members as well as MLA professional staff. It was administered via SurveyMonkey and distributed through email over the course of two weeks in October 2019. Results: The demographics portion of the survey--beyond asking the usual questions about race or ethnicity (72% white), age (65% between 30 and 59), and so on--also asked questions that were more specific to diversity including, but not limited to, gender representation (79% female), sexuality (67% heterosexual), military service (97% have never served), ability (26% have anxiety sometimes or in certain situations), and college financial aid (49% used federal student loans). Diversity-specific questions asked about diversity, equity, and inclusion (DEI) in the association: 59% strongly agreed or agreed that MLA has a strong commitment to DEI; 54% felt that the amount of time that association was spending on DEI issues was just about right; and 56% were very satisfied or satisfied with the DEI environment at MLA. Members also reported feeling like they belonged in MLA (59%), they were treated with respect (77%), and they were valued by MLA (59%) Conclusion: The survey paints a picture of the membership that is much deeper than any previously conducted membership survey. It shows the diversity of membership, especially in terms of ability and religion. Generally, the membership feels that MLA is right on target with the level of focus that MLA is giving issues of diversity. This survey reinforces the diversity work that has been done and supports diversity work in MLA in the future.	Link
13	Gender, technology, and libraries	Information technology (IT) is vitally important to many organizations, including libraries. Yet a review of employment statistics and a citation analysis show that men make up the majority of the IT workforce, in libraries and in the broader	Link

	September 2009, Information Technology & Libraries	workforce. Research from sociology, psychology, and women's studies highlights the organizational and social issues that inhibit women. Understanding why women are less evident in library IT positions will help inform measures to remedy the gender disparity.	
Age			
14	What makes age diverse teams effective? Results from a six-year research program 2012, Work	Based on a new model of productivity in age diverse tams, findings from a six-year research program are reported in which data from more than 745 natural teams with 8,848 employees in three different fields (car production, administrative work, financial services) were collected. Moreover, central assumptions of this model were tested with a representative survey of the German workforce (N = 2,000). **Results support both significant advantages and disadvantages for age-mixed teams. Based on the findings, the following preconditions for the effectiveness of age diverse teams are identified: high task complexity, low salience and high appreciation of age diversity, a positive team climate, low age-discrimination, ergonomic design of work places, and the use of age differentiated leadership.** Based on these insights, we developed a new training for supervisors, which addresses the aforementioned aspects and seeks to improve team performance and health of team members. It was found that the training reduces age stereotypes, team conflicts and enhances innovation. Thus, we can conclude that effective interventions for a successful integration of elderly employees in work groups are available and that combinations of measures that address ergonomic design issues, team composition and leadership are to be strongly recommended for practice.	Link
15	Dissertation: Diversity and inclusion in information technology from an age perspective: Motivating and managing information technology professionals across multiple generations in the workforce	The purpose of this quantitative study was to investigate diversity and inclusion from an age perspective among information technology (IT) professionals that were categorized as 4 different generations in the workforce today: Traditionalists, Baby Boomers, Generation X, and Generation Y. At the same time, this study sought to examine motivational factors and management and leadership styles used to motivate and lead IT professionals across generations in the workforce today. To investigate diversity and inclusion, motivation, and	*Abstract only*

	2011, Dissertation Abstracts	management/leadership styles among IT professionals across generations, a 4-prong survey instrument was used in this descriptive and one-way analysis of variance (ANOVA) quantitative study. The statistical assumption of homogeneity of variance was tested and significant differences between groups were followed-up with post hoc analyses (e.g., Bonferroni comparisons) in order to determine which groups were statistically significantly different. To gather information on each generational cohort, Traditionalist, Baby Boomers, Generation X, and Generation Y, a generic demographic instrument was used in this study. In addition, a survey created by L. K. Larkey (The Development and Validation of the Workforce Diversity Questionnaire: An Instrument to Assess Interactions in Diverse Workgroups, 1993), Workforce Diversity Questionnaire (WDQ); the Work Performance Inventory (WPI), created by T. M. Amabile, K. G. Hill, B. A. Hennessey, and E. M. Tighe (" The Work Preference Inventory: Assessing Intrinsic and Extrinsic Motivational Orientations, " 1994); and the Multifactor Leadership Questionnaire (MLQ)-5X Short Form, developed by B. M. Bass and B. J. Avolio (Multifactor Leadership Questionnaire: Manual and Sampler, 2004), were used in this study to gather data on interactions, motivations, and preferred managerial/leadership styles of IT professionals in the workforce. IT professionals from both the public and private sector of the United States took part in this quantitative research study. Analysis of the data suggests that there are differences with regard to interactions, motivation, and preferred leadership styles by each generational cohort of IT professionals in the workforce. Based on the conclusions drawn from the findings of this study, a number of recommendations were made for executives and business leaders to help overcome some of the challenges faced by organizations with 4 different generations of IT professionals in the workforce today.	
Dyspraxia and dyslexia			
16	What jobs are good for people with dyspraxia? Exceptional individuals	Dyspraxia is a learning difference that mainly affects motor coordination. It can affect speech and is a lifelong condition. This developmental coordination disorder is distinct from other motor disorders such as cerebral palsy, and occurs in many individuals with varying levels of intelligence. How the difficulties present themselves can also vary, and can change over time depending on environmental changes and life experiences.	Link

Gender			
17	Diversity: finding a first job made harder The British Computer Society (the Chartered Institute for IT)	A survey by BCS, The Chartered Institute for IT, found 45% of women working in IT believe their gender is the main barrier to getting ahead in their career, and when it comes to getting that all important first job in IT, almost a third of women (30%) thought their gender is their biggest barrier, compared with only 4% of men asked the same question. Here's the case study of one highly-skilled woman who found it hard to get a foot on the ladder.	Link
18	Improving the retention of women in in the IT workforce: an investigation of gender diversity interventions in the USA February 2018, Information Systems Journal	To meet the high demand for information technology (IT) professionals, organizations must become more effective at attracting and retaining women. Ninety-seven percent of companies surveyed by Forbes in 2011 had implemented diversity and inclusion interventions. Despite these efforts, the percentage of women working in IT continues to decline, raising questions about the effectiveness of current organizational interventions aimed at increasing gender diversity. This study sought to gain a better understanding of these organizational interventions by developing a comprehensive framework based on comparative case studies of 9 organizations. The framework integrates intervention characteristics and barriers IT women experience and the coping methods they use to address barriers. This paper presents propositions based on this theoretical framework to guide further research on the effectiveness of gender diversity and inclusion interventions in IT.	Link
19	Turnover or turnaway? Competing risks analysis of male and female IT professionals' job mobility and relative pay gap March 2015, Information Systems Research	This study draws on distributive justice, human capital, and stigmatization theories to hypothesize relationships between relative pay gap and patterns of job mobility. Our study also expands the criterion space of job mobility by contrasting different job destinations when information technology (IT) professionals make job moves. We examine three job moves: (a) turnover to another IT job in a different firm, (b) turnaway-within to a non-IT job, and (c) turnaway-between to a different firm and a non-IT job. We analyze work histories spanning 28 years for 359 IT professionals drawn from the National Longitudinal Survey of Youth. We report three major findings. First, as hypothesized, larger relative pay gaps significantly increase the likelihood of job	Link *Abstract only**

		mobility. Second, IT males and IT females have different job mobility patterns. IT males are more likely to turn over than turn away-between when faced with a relative pay gap. Further, and contrary to predictions from human capital theory, IT males are more likely to turn away-within than turn over. This surprising finding suggests that the ubiquitous use of IT in other business functions may have increased the value of IT skills for non-IT jobs and reduced the friction of moving from IT to other non-IT positions. Third, and consistent with stigmatization arguments, IT females are more likely to turn away from IT than to turn over when faced with a relative pay gap. In fact, to reduce relative pay gaps, IT females tend to take on lower-status jobs that pay less than their IT jobs. We conclude this study with important theoretical, practical, and policy implications.	
20	Women in tech: time to close the gender gap 2017, PWC	Our research with over 2,000 A-Level and university students shows that the gender gap in technology starts at school and carries on through every stage of girls' and women's lives. Only 27% of female students we surveyed say they would consider a career in technology, compared to 61% of males, and only 3% say it is their first choice. We're using the power of intelligent digital to see beyond the gender gap, to a world where women can reimagine our future. We created a women in technology programme and degree, changing the ground rules to make technology a more attractive, inclusive, working environment for all. We provide more detailed analysis and four actions the industry should take in the full report, which you can download below. "The gender imbalance in technology doesn't just represent a missed opportunity for women and society, but also for businesses. There's a growing body of evidence – supported by everyday experience in organisations across the country – that having a more diverse workforce, including an equitable gender balance, makes for a better business. This reflects the wide range of benefits that flow from workplace diversity, ranging from the ability to engage customers more effectively by mirroring wider society, to enhanced abilities in areas where women are especially strong, such as problem-solving and emotional intelligence. **Put simply, diversity is a business advantage. And other research studies by PwC confirm that the benefits of diversity**	Link

		include having a head-start when it comes to attracting the best technology talent. Indeed, our recent report – "The Female Millennial – The new era of talent"5 – **finds that creating and supporting a diverse workforce is a prerequisite for winning the battle to attract today's top female recruits. In the study, 83% of British female millennials stated that they actively seek out employers with a strong record on diversity, equality and inclusion – and while they say employers talk about diversity, 66% do not feel opportunities are equal for all."** (p. 3)	
21	The female millennial: a new era of talent 2015, PWC	A report about the #femalemillennial born between 1980 and 1995 Organisations the world over are currently facing the challenges that come with vast numbers of millennial talent entering and reshaping the workforce. In parallel, they are also challenged with a lack of women in leadership positions, and fast becoming concerned with the financial and competitive toll this could mean for their organisations. Organisations looking to address the gender leadership gap must drive parallel efforts that tackle enhanced leadership diversity in conjunction with systemic change efforts targeting their workforce from day one. But to get this right, first, organisations must better understand how to attract, develop, engage and retain female millennial talent.	Link
22	Closing the tech gender gap through philanthropy and corporate social responsibility 12th September 2018, McKinsey	It is hardly news that women—particularly women of color—are chronically underrepresented in the US tech sector. Perhaps more alarming is that the trend is headed in the wrong direction. The percentage of computing roles women hold has largely declined in the United States over the past 25 years. This report, *Rebooting representation: Using CSR and philanthropy to close the gender gap in tech*, offers a detailed analysis of the current state of the tech sector's gender gap, as well as practical guidance for tech companies interested in increasing the diversity of the tech pipeline.	Link
23	Tackling the technology gender gap together	"The Department for Business Innovation and Skills evidence has illustrated that where diversity is sufficiently well-embedded employers reap significant	Link

	n.d., Skills Development Scotland	business benefits from equality and diversity, such as increased staff engagement and retention, more creativity and better problem solving due to a wider range of perspectives. Encouraging a diverse workforce also widens the talent pool from which to recruit, and employers may be better able to adapt to increasing consumer diversity when this diversity is also reflected in its workforce" p. 16	
24	Women in ICT and Digital Technologies: an investigation of the barriers to women entering, staying, and progressing in the sector, and actions to ameliorate this 2016, Edinburgh Napier University	This report summarises research conducted to explore the under-representation of women in the ICT and Digital Technologies sector in Scotland, and the possible reasons for, and solutions to, this problem. A mixture of desk-based and original quantitative and qualitative empirical research was carried out in order to explore the barriers to women entering, staying and progressing in the sector. The research suggested a number of features of the sector that may put women off entering it, or staying in it, and may explain in part women's lower representation: • Negative perceptions of people who work in the sector – the nerdy young male of popular and media stereotypes; • A lack of visible female role models in the industry; • An expectation of long working hours and a lack of flexibility; • A male dominated workplace, that is both itself intimidating, and potentially leads to gendered working cultures and practices; • A feeling among female employees in the sector of not belonging; and • In some cases, direct instances of discrimination, or negative assumptions about their competences on the part of employers and clients. "A systematic review of the literature on the business case for equality and diversity, on behalf of the Department for Business Innovation and Skills, **found evidence that firms have reaped business benefits from equality and diversity, such as increased staff engagement and retention, and more creativity and better problem solving due to a wider range of perspectives. Furthermore, it widens the talent pool from which to recruit,**	Link

		and firms may be better able to adapt to increasing consumer diversity when this diversity is also reflected in its workforce. However, the authors of the review stressed that these benefits tend to only accrue where diversity is sufficiently well-embedded and managed." (p.2 – to read the systematic review mentioned see result 1 in this table).	
25	Dissertation: Factors that influence whether mid-level career women pursue senior IT roles 2019, Dissertation Abstracts International	Women are vital members of the information technology (IT) sector and contribute significantly to innovation. Yet, globally, women continue to be under-represented and under-supported. Although the technology sector is steadily growing each year, the number of women that enter the IT sector is declining and the number of women that pursue an IT career is not reflective of the number of mid-level career women that are advancing to senior IT positions. Mid-career level women are leaving their IT careers and taking valuable talent and years of experience with them. Little research has been conducted providing insight into factors that impacted women's decisions about career progression to senior IT roles. The purpose of this dissertation is to examine the factors that influence mid-level career women to pursue senior IT roles. The theoretical lens used to view the evidence was the individual differences theory of gender and IT. The role of women in IT sectors is examined to determine if there is a relationship between how women perceive themselves and their decisions to pursue senior IT positions. Evidence-based research using a systematic review process was conducted to examine 46 studies selected from scholarly, peer-reviewed articles and gray literature. Factors were identified through a thematic analysis and synthesis to answer the research question. The outcome of the research identified three factors that influenced whether mid-career level women pursued senior IT roles. By conducting a thematic synthesis, workplace, individual, and socio-cultural factors, such as gender bias, mentoring, glass ceiling, Queen Bee phenomenon, family acceptance, or self-efficacy, emerged that influenced women's decisions on whether to pursue senior IT roles, exit the IT industry, or stay in a current position in either a primary or secondary support role.	*Abstract only*
26	The (dis)placement of women in the IT workforce: An investigation of	This paper reports on an investigation of career anchors of women in the information technology (IT) workforce that was directed at enhancing within-	Link

	individual career values and organisational interventions November 2012, Information Systems Journal	gender theorising about career motivations of women in the IT profession. Our theoretical lens, the individual differences theory of gender and IT, enabled us to look more critically at how the effects of interventions are embedded in the range of women's career anchors that takes within-gender variation into account. The analysis demonstrates that organisational interventions must be flexible enough to account for the diversity and variation among women. Further, the analysis shows that it is necessary to move away from 'one size fits all' organisational interventions that often reflect stereotypes about women in the IT workforce.	*Abstract only**
27	Early determinants of women in the IT workforce: A model of girls' career choices 2005, Information Technology & People	Purpose: To develop a testable model for girls' career choices in technology fields based on past research and hypotheses about the future of the information technology (IT) workforce. Design/methodology/approach: Review and assimilation of literature from education, psychology, sociology, computer science, IT, and business in a model that identifies factors that can potentially influence a girl's choice towards or against IT careers. The factors are categorized into social factors (family, peers, and media), structural factors (computer use, teacher/counselor influence, same sex versus coeducational schools), and individual differences. The impact of culture on these various factors is also explored. Findings: The model indicates that parents, particularly fathers, are the key influencers of girls' choice of IT careers. Teachers and counselors provide little or no career direction. Hypotheses propose that early access to computers may reduce intimidation with technology and that same-sex education may serve to reduce career bias against IT. Research limitations/implications: While the model is multidisciplinary, much of research from which it draws is five to eight years old. Patterns of career choices, availability of technology, increased independence of women and girls, offshore/nearshore outsourcings of IT jobs are just some of the factors that may be insufficiently addressed in this study. Practical implications: A "Recommendations" section provides some practical steps to increase the involvement of girls in IT-related careers and activities at an early age. The article identifies cultural research as a limitation and ways to address this. Originality/value: The paper is an assimilation of literature from diverse fields and provides a testable model for research on gender and IT.	Link

28	Theoretical approaches to gender and IT: Examining some Australian evidence September 2012, Information Systems Journal	Researchers have sought a theoretical perspective to explain the under-representation of women in the information technology (IT) workforce of many nations. Gender imbalance limits the size and skill sets of IT human resources. The essentialist theory, social construction theory and individual differences theory of gender and IT have been proposed to account for the IT gender gap. This study examined evidence for these theories to explain this gap through content analysis of articles published in the national newspaper, The Australian, over three time periods. Newspaper articles report implicit theoretical perspectives on IT and gender and influence the views of the Australian public, including women. While evidence to support all theories was found over the three periods, the essentialist theory was dominant. Increased utility of the individual differences theory to account for the IT gender gap was seen in 2007–2008. The primary contribution of this study is to provide evidence that suggests that theoretical approaches, whether implicit or explicit, shape how people understand the under-representation of women in the IT workforce. Media interventions are proposed to help redress the imbalance through increased awareness.	Link *Abstract only**
29	Dissertation: The lived experiences of women in the information technology field as they transition from one leadership level to the next: A phenomenological study 2017, Dissertation Abstracts International	There is an increasing disparity of women in the IT field, when compared to men, specifically within IT executive leadership roles. The number of women in IT executive leadership lags drastically behind men IT executives and has gone down by five percent since 2008. Despite significant growth in the IT field women are not growing with it. IT jobs are expected to increase by 1.5 million in the next decade. The purpose and central question of this qualitative phenomenological study was to explore the lived experiences of women and how they develop as IT leaders. Beginning with 19 broad questions, the researcher explored the lived experiences of nine women in IT leadership positions that lived in the Midwest, Southwest and West regions of the United States. Long and in-depth interviews were conducted with participants in order to understand their leadership development experiences in their change in job requirements, change in time application, change in skill set and change in work values as they transitioned from one level of leadership to the next. Participants were women in IT mid- level management and IT executive level leadership that had more than one year of experience in their IT leadership	Link

		role. Drotter, Charan and Noel's (2011) conceptual leadership development pipeline model was used as the framework for this study. For the purpose of this study, IT middle management roles are referred to as passages 3 or 4, and IT executive leadership roles are referred to as passages 5 or 6 on the leadership development pipeline spectrum. The phenomenological analytical framework strategy developed by Moustakas (1994) was used to analyze and interpret data that were collected from participants' interviews, resumes, biographies, LinkedIn profiles and other pertinent data such as professional membership affiliations, company and personal websites when available. The phenomenology framework was used to explore and analyze how women in IT fields view their world of leadership development, which revealed the following eight themes: (1) formal and informal leadership preparation, (2) mentoring, sponsorship and networking, (3) IT workplace and cultural challenges, (4) purposeful and strategic thinking, (5) managing transitions and self-renewal, (6) work life balance and family influence, and (7) strength and resilience. Although some of the findings in this study validated what was found in the literature, new knowledge was also uncovered as well as the need for future research, including how early do women in IT fields start planning a leadership development strategy for executive leadership compared to when men in IT executive leadership fields start. The study shed light on the leadership development and value of women in IT mid- level management and in IT executive leadership positions through their own voices and lived experiences.	
30	Dissertation: The exodus of mid-career American women from the information technology profession: A Delphi study 2016, Dissertation Abstracts International	The purpose of this qualitative research study using a modified Delphi technique and secondary longitudinal data collected from the Bureau of Labor Statistics and the National Center for Education Statistics was to explore and understand reasons leading to the underrepresentation of women in the IT profession in the United States through the theoretical framework of gender theory, voluntary employee turnover, and career change. Reports of the underrepresentation of women in the IT workforce created the need to understand how to retain mid-career American women in the IT profession. The Delphi panel identified top ranked reasons for the underrepresentation of women in IT as: (a) barriers to returning to IT work following a break in employment, (b) technical competence, (c) age, (d) education programs, (e)	Link

		male-dominated workplace, (f) perceived as less technical, (g) the glass ceiling, (h) the old boy's network, (i) work-life balance, (j) burnout, (k) stress, (l) 24/7 work schedules, and (m) job satisfaction. The secondary longitudinal data (1990 to 2011) revealed that male participation in the IT profession doubled since 1990, explaining the significant change in representation of women in the IT workforce. The recruitment of women did not keep pace with the recruitment of men into the IT profession. The recession that took place from 2007 to 2010 affected the retention of women in the IT workforce by limiting the unemployment rate of female IT professionals to 2% when the unemployment rate for the U.S. female workforce was 4.5%. The Delphi panelists offered recommendations to organizational leaders on retaining mid-career American women in the IT profession.	
31	Dissertation: Moving beyond the toy vs. tool hypothesis: An examination of gender differences in adolescents' computer activities, attitudes, and technology-related career plans 2007, Dissertation Abstract International	In order to provide some explanation for the gender gap within the IT workforce, the current study offers a detailed look into the evolving ways adolescents use computer technology. Guided by Eccles expectancy-value model of achievement motivation, the study examines associations between adolescents' career attitudes and expectations for success, values, and activity-involvement. Student participants (n = 460) from two high schools in central Pennsylvania took a web-based survey that assessed their computer attitudes and activities. Results suggest that adolescent males and females spent about the same amount of time on computer activities each day. Gender differences, however, were found with respect to computer attitudes and career beliefs, and many of these gender differences were larger among 12th graders than 9 th graders. Moreover, adolescents' self-confidence, reports of troubleshooting, computer time with friends, gender beliefs, and enrollment in computer courses were significantly related to computer career interest and efficacy. Overall, results suggest that the original "toy vs. tool" hypothesis has become too simplistic and will not help researchers understand the current gender divide in the technology workforce.	Link
32	Dissertation: The perception of women contending for first place in the information technology world: A qualitative case study	Gender differences have impacted the leadership IT (information technology) environment for decades. Research continues to study the barriers and triumphs women endure within the technical leadership world. Over the past decade, women have strived ahead by ignoring the gender negativity and taken a permanent position in the IT leadership role. The implications of project	*Abstract only*

	2017, Dissertation Abstracts International	management and other managerial strategies have impacted implementations, departmental employees, governance procedures, and their association with end users. The literature review explores the phenomenon of women in IT leadership roles, and the triumphs and challenges they endure. Acknowledging the self-knowledge, facilitation skills, and the ability to empower others is gradually changing the gender imbalance in organizations. This study provides a review on existing gender barriers, but exposes the progression women are attaining as IT professionals. This study used a qualitative, exploratory case study approach. Among the themes emerging from the date were education, experience, characteristics, barriers, and communication.	
33	Why don't more women major in information systems? 2011, Information Technology & People	Purpose: Increasing enrollments in colleges of business have not been matched by women majoring in the field of information systems (IS). This paper aims to explore reasons why women choose not to major in information technology disciplines and to suggest potential solutions. Design/methodology/approach: The authors used a behavioral model based on the theory of reasoned action and a survey of the students enrolled in six sections of a college-wide MIS course to help them answer the fundamental question "Why don't more women major in information systems?" They also used partial least squares analysis to estimate the parameters of the model and the results of several open-ended survey questions to validate their statistical findings, leading to a richer triangulation of study results. Findings: The study found that a "genuine interest in IS" and the "influence of family" most account for a woman's decision to major in information systems. Equally important are those items that did not appear to attract females, including such matters as "job-related factors" or the "influence of fellow students or friends". These findings have important recruitment and retention implications as well as suggesting some avenues for further study. Originality/value: The analyses suggest that there is much faculty and business recruiters can do to encourage more females to major in IT-related disciplines. One is to encourage women to develop more interest in the field. Another is to create more study options for women with hard-science talents who want to pursue technologically-intensive careers. Finally, teachers, academic institutions, and employers might find it useful to address some of the misconceptions that women might have about IT-	Link

		related jobs—for example, that IT jobs are only for males or computer geeks—and stress the many positive dimensions of IT career paths.	
34	Saying "welcome" is not enough: Women, information systems and equity in work 2000, The Career Development Journal	The rise of all forms of information systems has been one of the major factors affecting the nature of work over the last decade. This article reports on research that suggests that whilst females may now gain more experience of computers and information systems at an earlier age, this does not appear to lead to more favourable evaluations of jobs involving computers. If women overcome initial negative perceptions of jobs involving computers then the particular style, manner, skills or approach that are seen as prerequisite for success, can constitute an additional barrier over and above that of the "glass ceiling". The study looked at factors influencing initial attitudes towards computers, female attitudes to jobs involving computers and factors influencing self-selection into gender-typical and atypical jobs, including IT-based jobs. The article considers the actions required from managers in many roles, including those with responsibility for staff development, marketing and recruitment.	Link *Abstract only**
35	Why are there so few women in information technology? Assessing the role of personality in career choices August 2008, Journal of Economic Psychology	Despite increases in female labor force participation, women remain substantially under represented in most scientific and technical fields. The small number of women in engineering, physics, chemistry, computer science and other similar fields has variously been attributed to discrimination, differences in ability or choice. This paper uses a unique data set containing information on vocational interests to examine the determinants of entry in to Information Technology occupations. We show that men and women differ systematically in their interests, and that these differences can account for an economically and statistically large fraction of the occupational gender gap.	Link
36	A qualitative narrative inquiry study investigating the life experiences of identified females in their efforts to participate in technology careers when America needs more technology workers and technology leaders	The experiences of identified females in their efforts to participate in technology careers as workers and leaders was examined in this study. Studies indicated America did not have enough skilled talent to fill technology jobs and there were disproportionately low numbers of female workers and female leaders who participated in technology careers (Ashcraft, McLain, & Eger, 2016; Zweben & Bizot, 2016). Statistics revealed women represented 57% of the labor force, but only 20% in the technology industry (Cyberstates 2017, 2017; United States Labor Department Bureau of Labor Statistics, 2015). I utilized	Link

	2019, Dissertation Abstracts International	narrative inquiry research design with feminism and gender role incongruity theories as theoretical frameworks. I interviewed five female technology leaders in their natural setting using Seidman's (2013) three step interview process to understand their experiences becoming and serving as technology leaders. Data analysis using memos, categorizing, document analysis, and constant comparative methods revealed four major themes: climb your ladder, know your worth, discover your career, and nurture your vision. Participants revealed discriminatory exclusions and bias against female specific issues like pregnancy and work and life demands as the primary barriers for entering and staying in the technology field. Barriers were mitigated by their intrinsic motivation augmented by encouraging role models, personal persistence, interpersonal skills, and risk aversion. Study participants exhibited an innate ability to nurture team members and organization goals using soft skills to ameliorate the rigid and fast-paced technology industry. They favored a balance that incorporated aspects of both genders to develop individuals and the organization which may encourage a diverse talent pool of American men and women who will be highly competitive in the growing field of technology.	
37	Improving the retention of women in the IT workforce: An investigation of gender diversity interventions in the USA November 2018, Information Systems Journal	To meet the high demand for information technology (IT) professionals, organizations must become more effective at attracting and retaining women. Ninety-seven percent of companies surveyed by Forbes in 2011 had implemented diversity and inclusion interventions. Despite these efforts, the percentage of women working in IT continues to decline, raising questions about the effectiveness of current organizational interventions aimed at increasing gender diversity. This study sought to gain a better understanding of these organizational interventions by developing a comprehensive framework based on comparative case studies of 9 organizations. The framework integrates intervention characteristics and barriers IT women experience and the coping methods they use to address barriers. This paper presents propositions based on this theoretical framework to guide further research on the effectiveness of gender diversity and inclusion interventions in IT.	Link *Abstract only**
38	Sustaining and advancing IT careers: Women's experiences in a UK-based IT company	This article contributes to a growing literature on women in IT occupations. Against a national and international context of women's longstanding and continued under-representation in senior professional roles in IT, our study at organizational level tells the story of women's career experiences in a specific	Link

	June 2018, Journal of Strategic Information Systems	UK-based IT company in relation to its culture, processes and practices. Utilising a concept from the gender literature—Acker's (2006) 'inequality regimes'—the study bridges the gap between the gender and IS literature and feminist theorising in order to shed light on the lack of gender diversity in IT. The article specifically shows how components of organizational inequality regimes, namely, 'organizing processes', 'legitimacy' and 'visibility' of inequalities combine and interact to produce and maintain gender inequality in the IT workplace. The implications of this in the sector more generally are discussed.	
Neurodiversity			
39	Neurodiversity as a Competitive Advantage May-June 2017, Harvard Business Review	Meet John. He's a wizard at data analytics. His combination of mathematical ability and software development skill is highly unusual. His CV features two master's degrees, both with honors. An obvious guy for a tech company to scoop up, right?	Link
40	Neurodiverse workforce: inclusive employment as an HR strategy 14th October 2019, Strategy HR Review	Purpose: This study aims to develop and propose a Neurodiversity-Smart HR framework that may facilitate organizations to build an inclusive workforce. Design/methodology/approach: Real cases of inclusive companies in India such as Lemon Tree Hotels have been explored in detail through observations, video interviews of company's leadership and personal discussion with special-needs community to design a generalized framework. Findings: Development of Neurodiversity-Smart HR framework that integrates resources from multiple stakeholders. Practical implications: The proposed framework shall facilitate organizations to build an inclusive workforce and engage with the special-needs community throughout the inclusion process. The neurodiversity approach is a potential solution to organizational issues such as innovation, engagement, social responsibility and attrition.	Link *Abstract only**
41	Embracing neurodiversity in the workplace 27th November 2017, CIPD	We are really pleased to be working with Uptimize – pioneers of neurodiversity through online learning – to develop a guide for HR professionals and employers to embrace neurodiversity at work, to be published next year.	Link

		Neurodiversity refers to the infinite variety of human neurocognitive styles. While societies have often celebrated biodiversity and cultural diversity, aspects of human *neuro*diversity such as autism, dyslexia, and ADHD have long been considered as medical disorders, with attention focused on how to overcome these differences. The new perspective of the 'neurodiversity paradigm' sees these as natural differences in thinking style that can lead to strengths, as well as challenges, in the workplace. There is much discussion about the benefits of 'diversity of thought' for organisations, and we at the CIPD are excited to see how our empirical understanding of the benefits of workplace neurodiversity evolves.	
Persons with disabilities			
42	Employment of persons with disabilities in information technology jobs: literature review for "IT works" 2002, Behavioural Sciences and the Law	This article reviews relevant literature as to the labor pool of qualified individuals with disabilities and employment in information technology (IT) sector jobs. First, the article reviews the empirical literature on barriers to employment in IT for persons with disabilities. The examination then is extended to studies of barriers to employment for individuals with disabilities in other employment sectors. Findings illustrate the limited experiences that IT and non-IT companies have in employing and accommodating employees with disabilities. Implications are discussed for enhancing the employment of qualified workers with disabilities in IT through research, education, training, and mentoring programs.	Link *Athens log in required**
Race and ethnicity			
43	BAME role models that will inspire diversity in tech 13th November 2019, Nesta	I am greatly honoured, excited and proud to be recognised as one of the top 100 most influential Black, Asian and Minority Ethnic (BAME) leaders in Tech. It is a privilege to follow in the footsteps of last year's innovators and leaders, such as Eileen Burbidge, Partner at Passion Capital and FinTech envoy at UK Treasury, June Angelides, Founder of Mums in Technology, and VC at Samos Investments and Tom Ilube, Founder and Chief Executive at Crossword Cybersecurity. Like Eileen, I also studied computer science at university and	Link

		then went on to work in tech and investment. Like June, I am a mother of two daughters and want more women to work in tech. Like Tom, I am passionate about empowering girls and those from disadvantaged backgrounds to study and work in tech.	
44	Dissertation: The influence of race, ethnicity, and gender on advancement in information technology 2018, Dissertation Abstracts International	This study investigated the experiences of African American/Black, Asian American, Caucasian American/White, and Latina/Hispanic American women who advanced from operational or technical IT roles to senior executive IT roles. The intent was to understand how individual and organizational factors influenced the women's career advancement journey and what role, if any, gender, race or ethnicity played in the journey. Advancement research that solely focuses on gender, race, or ethnicity provides an insufficient and limited examination of women's advancement journey. Rather than treat gender and race or ethnicity as mutually exclusive categories of experience and analysis, this study approached the topic from a gender intersectionality perspective and used the individual differences theory of gender and IT as an analytical lens. As a result of the analysis, six themes emerged: pathways to the senior IT executive role, informal networks, bias, credibility and legitimacy, the importance of support, and the importance of technical skills. Although some findings support existing research on women's career barriers, the intent was not to generalize the findings to all women. Rather, the study's results demonstrate that racial and ethnic variations among the women in addition to a variety of other factors contribute to different career progression experiences.	*Abstract only*
45	Relations among ethnicity, gender, beliefs, attitudes, and intention to pursue a career in information technology April 2008, Journal of Applied Social Psychology	Using data from 159 African Americans and 98 Anglo Americans, we examined relations among ethnicity, gender, information technology (IT) self-efficacy, occupational stereotypes, attitudes toward IT, and IT career intentions. Results revealed that IT self-efficacy and occupational stereotypes were related to attitudes toward IT jobs, and these attitudes were positively related to career intentions. In addition, there were ethnic and gender differences in IT self-efficacy and occupational stereotypes. In particular, African American men reported higher levels of IT self-efficacy, whereas Anglo American women reported lower levels of IT self-efficacy than did members of all other groups.	Link *Abstract only**

		Furthermore, Anglo Americans had more negative stereotypes of IT professionals than did African Americans. Implications for research and practice are discussed.	

Appendix

Sources and Databases Searched

Google, NHS Evidence, CIPD, the Runnymede Trust and the British Computer Society (the Chartered Institute for IT) were searched. Healthcare Databases Advanced Search (HDAS) was used to search the following databases: Medline; CINAHL; BNI; PsycINFO and HMIC. Google Scholar was used to citation match and find further relevant papers.

Search Strategies

Key words included: diversity; inclusion; equality; “protected characteristic*”; “neurodiversity”; “neuroatypical”; gender; disability; minorit*; BAME; age; LGBTQ; data; digital; tech; technology; informatic*; IT; “information technology”

Google (diversity OR inclusion OR equality OR "protected characteristics" OR "neuro diversity" OR "neuroatypical" OR dyspraxia OR dyslexia OR gender OR disability OR women OR minorities OR BME OR BAME OR LGBTQ OR age) AND (data OR digital OR tech OR informatics OR IT OR analysts OR "information technology") 18/9/20 | (diversity OR inclusion OR equality) AND (digital OR tech OR informatics OR IT OR analysts OR "information technology") 18/9/20

Searching the literature retrieved the information provided. We recommend checking the relevance and critically appraising the information contained within when applying to your own decisions, as we cannot accept responsibility for actions taken based on it. Every effort has been made to ensure that the information supplied is accurate, current and complete, however for various reasons it may not represent the entire body of information available.

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