AN INVESTIGATION INTO THE SIGNIFICANT IMPACTS OF AUTOMATION IN ASSET MANAGEMENT

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ABSTRACT

This paper explores the implications of applying automation, a technological force in which computer systems can fulfill human tasks, into the asset management industry. The investigation explores a number of significant topics in which managers should begin contemplating, including workforce origination post automation, the primary skills necessary to facilitate augmentation, and how robo advisors could challenge an organization's value proposition. The investigation was centered on Jupiter Asset Management (JAM) to support their preparations for automation, as well as to provide insight from the 'grass roots'. Research centered on interviews with experienced individuals within automative and asset management. The findings identify that current entry level occupations with systematic, repetitive tasks in a fixed domain, will be automated. Placing a greater demand for analytical abilities in junior recruits as the cognitive understanding of what data represents is a weakness of artificial intelligence (AI) thus strengthening augmentation between employees and technology. Automated investment profilers known as robo advisors will challenge the value proposition of organizations, such as JAM, which in time will need to be onboard with the technology to remain competitive within a growing millennial market. The paper concludes that there is an evident need for asset management firms to design training processes that blend enhanced senior level shadowing, with programmes focused on broadening juniors' abilities to interpret and apply AI generated data through a series of newly identified skills.
Keywords: Asset Management, JAM

1. INTRODUCTION AND RESEARCH OBJECTIVES

The asset management industry presides over the strategic investment of wealth, by attempting to increase deposit values whilst additionally mitigating investment risks through the comprehensive identification of market trends, rigorous analysis of multifaceted data, and logical process of informed decision making. Facilitated through a firm's dedicated 'portfolio

managers' these services are typically offered to high net-worth individuals, or institutions such as pension funds, sovereign wealth funds or other corporations (WallStreetOasis.com, 2015). The industry's presence within international financial affairs is exceedingly pronounced, consequently elevating its economic importance. In 2013 the worldwide value of assets under management were estimated at $87 trillion (approximately one year's global GDP), with PwC forecasting this to escalate to $100 trillion by 2020 (Bank of England, 2013). As a result of this predicted monetary value growth, it's fiscally important to the intercontinental economy to prevent instability and nurture growth of the industry. It has become ever more apparent in the 21st century that technological innovations will be a pressing managerial issue, in contending with this paradigm across many industries. A critical manifestation, and yet challenging innovative technology, that effective managers should take note of is the notion of automation. Automation is part of a wider Artificial Intelligence (AI) umbrella, which can be defined as "the theory and development of computer systems able to perform tasks that normally require human intelligence" (Deloitte, 2016). It takes numerous forms such as Robotic Process Automation (RPA), which formulates reasoning through pattern recognition of large quantities of data. Furthermore there is 'autonomics', where systems are able to complete routine tasks by interfacing with existing applications to process transactions and responses faster than a human (Deloitte, 2016). When discussing the ramifications of automation, it is typical to find individuals focusing on the impact upon manufacturing and other blue collar workflows. However, automative technologies vary and can be implemented into a wide scope of organisational processes. It is thus beginning to transpire that automation can be systematically deployed into professional white collar streams as well. For example, RPA has been brought into service by global wealth advisors, UBS, in what is called the SQREEM (Sequential Quantum Reduction and Extraction Model). This delivers customised guidance for their wealthiest clients, by aligning an individual's specific investment preferences to the most suitable financial product, thus substantiating a methodology of how automation could replace some white collar operatives in the bank (Vögeli, 2014). Although the economic and technological importance of automation has been well documented within blue collar processes, little research has yet emerged which considers the organisational opportunities, including refined decision making, reduced costs and improved innovation (Deloitte, 2016), and problems such as employee displacement (Bessen, 2016), which potentially may exist when applying the technology to the white collar sector. As a result, this paper contributes to the literature by investigating automation within the asset management sector, centered on one of the most respectable wealth management firms known as Jupiter Asset Management (JAM). More specifically this paper contributes by serving as an industry based case study that academics and managers alike can reflect upon, in order to prepare themselves for the impacts of automation within the white collar sector.

2. SUMMARY OF LITERATURE THEMES

According to Heathfield (2016) an entry level occupation facilitates an individual's ability to penetrate an organisation's workforce with relatively minor experience. White collar organisations, such as JAM, will typically require these persons to have undertaken an undergraduate degree related to their respective industry before employment considerations are made. Entry level tasks are often centered around those which senior figures don't wish or have time to complete. This crucially exposes a new entrant to a wide host of organisational processes, thereby facilitating a broad and multi-disciplined spectrum of talent development

that benefits the employee and the host firm. However, according to Frey and Osborne (2013), a significant number of these entry level positions will be automated in the coming years. This is further supported by the World Economic Forum (2016) which forecasts a substantial decline in office and administrative job roles by 2020. Consequently, it is plausible to suggest that traditional entry level occupations may be in decline as a result of automation type innovations and technologies. This consequently provokes an emerging managerial issue surrounding the forward looking structure of the firms talent acquisition methods, and the integrity of its talent development process. In respect of the financial services industry, sizeable occupational growth will dramatically shift towards roles within computing and mathematics (World Economic Forum, 2016). I.T. roles in general are poised to dominate the top tier of entry level occupations moving forward across multiple industries (Dill, 2015). As a result of these circumstances, and the International Data Corporation's prediction that organisational access to data will grow 50-fold over the next decade (Frey, 2014), it's subsequently plausible that data analysis and interpretation roles will become the contemporary foundation of entry level occupation schemes within the wealth management sector, as opposed to data processing. This notion is supported by UKCES (2014) who, in respect of the business and finance profession, state analytical occupations in the future will be of upmost importance. With regards to the predicted displacement of entry level roles, as a result of automation, the academic literature generally fails to consider what entry level credentials should be regarded as essential in a post automation professional services world. In response to this, this paper proposes the B-PAP model (Britton's Post-Automation Profiler). The B-PAP model helps outline the potential requirements (qualifications, experience or characteristics) for entry level employees when a high degree of roles, at lower levels in an organisation, are automated. The B-PAP model (Table 1) has been applied to JAM, the case study setting for this paper, in order to demonstrate its applicability.

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Table 1: B-PAP Model for the Asset Management Industry

Industry	Key Forward Looking Industry Needs for 2020
Asset Management	• Enhanced interpretive capabilities to formulate deep market insights, thus building a superior investment proposition for clients. • Ability to formulate synergies between large amounts of data acquired by advanced technological processes to find correlations and generate investment opportunities. • Improved operational efficiency driven by automative processes.
Job Level	**Typical Occupations of the Level & Industry for 2020**
Entry	• Business & Market Performance Analyst / Junior Data Analyst / Junior Programmer / Database & Networking Junior
- ENTRY LEVEL EMPLOYEES WILL THEREFORE REQUIRE -	
Qualifications (one option)	• BA in Finance & investment, as provided by Coventry University (2016). • BSc in Data Science, as provided by The University of Warwick (2016). • BSc in Software Engineering, as provided by De Montfort University Leicester (2016).
Experience (multiple options)	• Demonstrated financial prowess, by potentially making small investments in publicly traded companies. • Data analysis and arranging information into insightful arrays, by potentially using data visualisation software. • Programming, by potentially developing their own smartphone apps. • System and process development, by potentially collaborating in the building and or maintenance of servers.
Characteristics (all)	• Inquisitive / Diligent / Analytical / Logical / Agile / Technologically astute.

For managers it is evident that convergence between their human employees and modern automated counterparts will be essential in creating synchronous and valuable workflows. To facilitate this contemporary method of operation, it is arguable that augmentation is the primary optimisation route as supported by Davenport (2015). Broadly speaking, augmentation encourages a collaboration between humans and machines in order to complement each other's strengths, whilst compensating for each other's weaknesses (Davenport and Kirby, 2015). The MIT Economist, Autor (2014), denounces commentators who repeatedly overemphasize the use of automation as a mechanism for success, stating the challenge of instituting a machine that possesses flexibility, judgement and common sense similar to a human is "immense". With it apparent that machines do have some comparative disadvantages to humans, it is plausible that asset management organisations, like JAM, will need to re-configure its employees' current key skills in order to remedy overarching computer weaknesses, thus designing a modern workforce that can facilitate vigorous augmentation. According to Gray (2016), the top skills needed by employees by 2020, in an

era known as the AI driven Fourth Industrial Revolution, will largely focus on 'creativity' while 'quality control' could be potentially removed. Therefore, it is evident that in order to establish affluent automation, management will need to prioritise the enhancement of humanistic soft skills and social abilities in its employees, across a wide range of industries, rather than just hard technical skills such as programming. This notion is supported by the work of Davies et al. (2011), who also placed a significant emphasis on human interactive skills in their top ten future abilities needed of employees' talents by 2020. Gray's (2016) prediction on the top skills required of employee's by 2020 is a good start yet it is non-industry specific. As a result, this paper builds on the work of Gray (2016) by considering the skills and abilities required of employees, for the asset management industry, within the AI driven Fourth Industrial Revolution. The Ten-ES Model (Table 2) is a conceptual application of the top skills thought to be required, in the emerging Fourth Industrial Revolution, for the asset management industry. The framework conceptually prioritizes the skills that may need to be obtained in order to allow organisations to fully capitalise on the introduction of automated entry level roles. In this paper's theoretical prediction, the more humanistic soft skills have been placed within the higher rankings to compensate for AI's lack of emotive understanding.

Table 2: Ten-ES Model for the Asset Management Industry

INDUSTRY: Asset Management		
TARGET YEAR: 2020		
Rank of Importance	Skill	Justification
1 (Most Important)	Emotional Intelligence	• Ability to understand the emotive needs of clients will be a key differentiator to empower sales, and AI's most prominent weakness.
2	Negotiation	• Important in enabling portfolio managers to broker mutually favourable terms for the firm and its client in an AI competitive market.
3	Co-ordinating with Others	• Important to ensure each operation within the firm plays its part in delivering the promised results.
4	Creativity	• Empower humans to develop contemporary offerings and innovative uses of AI as a competitive force.
5	People Management	• Important to nurturing augmentation between humans and machines.
6	Service Orientation	• Important to finding correlations in research data, which could lead to profitable investments and value proposition growth.
7	Complex Problem Solving	• Necessary to accomplish challenging objectives. AI will assist staff in forming best practice solutions.
8	Cognitive Flexibility	• Creates adaptability in planning and thinking, when AI's identify more efficient ways of operating.
9	Programming	• Important to building and maintaining modern AI's, however machine learning will become ever more able to improve itself.
10 (Important)	Logical Reasoning	• Important to understanding the consequences of AI's proposed actions.

Whilst automative technologies emerge as an electrifying opportunity for managers to empower the value proposition of their firm, so too does it arise as a challenging force. In respect of the asset management industry, this is evident in the fruition of 'robo advisors' (RAs). As a defining trend of 2014 onwards, RAs allow firms that use complex algorithms to leverage a client's information and then formulate tailored investment recommendations by executing highly diversified automative investment portfolios at lower costs when compared to traditional asset management firms (Hougan, 2015). RAs have shown unprecedented growth, with the leading eleven wealth management organisations increasing the total assets under management by RAs to 65% - this was equivalent to an all time high value of $19 billion by the end of 2014 (Miller, 2014). Whilst this monetary valuation is notable it is also negligible against the total assets under management of Vanguard for example, one of the world's largest investment firms, who alone controlled $3 trillion at the end of 2015 (The Vanguard Group. 2016). Nevertheless, according to Vincent et al. (2015), RAs will cause significant disruption in the wealth management industry for a variety of reasons. Firstly their substantially lower fees will open the market to mass consumers (with assets under $200k), who seek affordable financial assistance with a healthy return. Secondly, RAs will cater towards the digital preferences of millenials (individuals born post 1980), who seek greater control of their funds at anytime, anywhere. Finally, the technology will also reduce barriers to entry, as 'Robo SMEs' will surface more often to challenge established organisations incumbent value propositions. Whilst UK high street banks, such as Lloyds, Santander and Barclays, are planning to launch RAs into the mass market (Dunkley and Arnold, 2016), Allianz (2015) indicates that specialised asset management firms will in the short term choose to ignore this phenomenon. This is because the majority of Baby Boomers (individuals born between 1946 and 1964) and GenXers (individuals born between 1965 and 1980) will still desire a humanistic relationship within their financial affairs. These two generational groups are important as they contain the largest proportion of high net-worth individual investors, at present. However, in the medium term future millenials will start emerging as a larger clientele segment, who will be more likely to be accustomed to the cost efficient and anytime nature of RAs. Consequently, in order to evolve a relevant value proposition whilst maintaining its premium service advantage (i.e. personalised human relationships), it is plausible JAM, and other asset management organisations, will need to establish a hybrid digital platform (part human, part automation) that aligns with the expectations of millennials (Greenhalgh, 2016). Whilst the literature concludes that firms such as JAM will need to establish a hybrid digital platform, what is lacking at present is how managers will practically achieve this version of part human, part automation working facilities. In order to assist in this issue, this paper attempts to bridge the gap by applying the Johnson et al. (2013) 'Buy, Ally or DIY' matrix (see application below in Table 3). The general principle proposed by Johnson et al. (2013) entails how to achieve a new capability through acquisition, alliances and organic development. By applying the knowledge derived from previously synthesized literature to the overarching guidance of Johnson et al's (2013) model, we are able to formulate a premise as to which strategy is most suitable for JAM.

Table following on the next page

Table 3: Adapted 'Buy, Ally, DIY Matrix' for JAM and other asset management firms

-	Buy (acquisition)	Ally (alliance or partnership)	DIY (organic development)	Advised strategy	Justification
High urgency	Fast	Fast	Slow	DIY	• Medium term scope of interest would enable JAM to take more time building a RA platform.
High uncertainty	Failures potentially salable	Share losses and retain buy options	Failures likely unsalable	Ally	• Unfamiliar territory to JAM. • Alliance with an experienced specialist will cut risks and bolster knowledge. Option to acquire could also be potentially brokered.
Soft capabilities important	Culture and valuation problems	Culture and control problems	Cultural consistency	DIY	• Enables JAM to build a RA fully around its own mantras, culture and client expectations.
High modular capabilities	Avoid buying whole company	Ally just with relevant partner unit	Develop in new venture unit	Ally	• Highly targeted alliances will ensure the use of solely RA technologies with no other commitments.

i) Advised strategies: Buy 0 / Ally 2 / DIY 2. ii) Ally has more 'green advocations' from (Johnson et al. 2013). iii) Final recommended strategy: ALLY

3. RESEARCH METHODS

As a result of the literature review, three conceptual frameworks were devised along with a host of associated premises, which required expansive research and ultimately ratification. The first was the B-PAP model (Table 1), which aimed to determine plausible traits of entry level employees at lower levels of an organisation, in an era when automaton, within the white collar sector, will be prevalent. The second was the Ten-ES model (Table 2), which details a feasible list of prioritised skills needed by entry level employees in order to allow organisations, within the asset management industry, to fully capitalise on automation in the lower levels of an organisation. In general, the Ten-ES model largely promoted the precedence to humanistic soft skills, thereby synthesising the work of Gray (2016) and Davies et al. (2011). The last premise provided by the literature review considers how managers will establish the automated capability predicted. Here an application of the Johnson et al's (2013) 'Buy, Ally or DIY' matrix was considered. In order to investigate these assertions the study interviewed richly experienced and knowledgeable individuals within the fields of automation and asset management, as a method to clarify and investigate the three conceptual frameworks with empirical evidence. The first interviewee was Simon Crawford, a Fixed Income, Multi-Asset Performance & Risk Manager. Crawford has worked at JAM for 15 years, amassing a deep working knowledge of JAM's financial products. Crawford also has a profound awareness of macro industry trends that could affect the asset management industry and was therefore an ideal candidate for commenting on the asset management industry's perception of automation particularly in JAM.

The second interviewee was Daniel Hulme, CEO of Satalia and Advisor to the UK Home Office. Hulme holds an Engineering Doctorate in Computational Complexity and thus has evidenced academic superiority in this field, presenting an experienced candidate who rendered profound insights on the forward looking ramifications of automation in the asset management industry. Both were interviewed using structured interviews, in order to streamline the discussions into key areas of interest, based around the three conceptual frameworks devised through the literature review. The duplicate use of predetermined questions for each interviewee prevented wastage of resources as well as facilitated truthful comparability between interviewee's responses, as guided by Saunders et al. (2012). To accommodate the investigatory process and establish an academic reference, both interviews were recorded, transcribed and have been stored electronically. Of crucial importance to the success of this investigation's data analysis before and after the commencement of interviews, was the use of an analytical pattern matching produce, which examined qualitative information. In accordance with this methodology (i) existing or personally developed models (B-BAP, Ten-ES as per the literature discussion) were utilised based upon the available literature, (ii) interviews were conducted which examined these assertions within the models devised, (iii) and finally both interview transcripts were interpreted in order to devise conclusions in comparison to the original conceptual models/frameworks. Where interconnected evidence existed between Hulme and Crawford, a valid explanation to support the findings had been identified. Where an unforeseen variable challenged the established thought of the investigations considered in the three conceptual frameworks, further inquiry was initiated so as to establish the reasoning behind its origin and thus developed a deeper level of contributory knowledge (Yin, 2009). The application of pattern matching has proven to be a useful methodology in this investigation. It allowed for the evolution of a robust set of research themes and frameworks through a clear framework of academic investigation, which supported the identification of appropriate interviewees (Miles and Huberman, 1994).

4. RESULTS, DISCUSSIONS, AND CONCLUSIONS

i) The reorganisation of JAM's talent development programmes
This investigation has found confirmation for the works of Frey and Osborne (2013) that indeed many typical entry level occupations will be automated, by way of Hulme and Crawford both concurring with this widely accepted notion. Hulme stated that roles which require "systematic, repetitive work in a fixed domain" will be primary operational targets for automation. However, the means to how this will impact management and their forward looking talent development protocols is nuanced and highly intriguing.

According to Crawford, if entry level roles are automated, then new recruits will begin a 'step up' within the organisation therein altering the firm's structure of career progression and operational formation. With the absence of menial tasks to educate new recruits, Crawford believed entrants would be placed into more extensive in-house training programmes, coupled with a greater degree of senior shadowing thus enabling for a more pragmatic application of education. Some of the contemporaneous academic elements of these training programmes have already been identified. For example, Crawford cites a significant issue with AI is that it can create a lack of understanding e.g. operatives are presented with a number but have no comprehension of how it was derived. As a means to answer this challenge, Hulme advocated that all personnel across from entry level to more senior operatives should have a

working comprehension of machine learning and AI, therein enabling an awareness of data analysis processes to which they can further interpret from a humanistic perspective.

In relation to the devised B-PAP model, the evidence largely supports and expands this investigation's theoretical 2020 asset management industry notions. For example, in terms of qualifications, Hulme cites psychological degrees as a credible option, given that management will need to comprehend the human decision making process in order to design services that resonate with the target audience, and ultimately design a compelling motivation to purchase. Crawford amazingly states that despite asset management firms being white collar, experience may not be required if a candidate is entering via a programme similar to the current industry wide 2020 scheme, which absorbs gap year and A-level students into the workforce. However, he did additionally cite the importance of maturity and intelligence as characteristics, particularly for any younger 2020 programme recruits.

In conclusion it is recommended that JAM, and other asset management organisations, should recognise and prepare for the loss of current entry level positions, by designing new training protocols that blend extensive in-house training programmes, with a greater degree of senior shadowing thus supporting juniors' abilities to interpret AI generated data. Prospective applicants to the firm should be considered against the ratified forward looking B-PAP model.

ii) The definitive top skills needed in asset management industry in the era of automation

In relation to the works of Gray (2016) and the World Economic Forum (2016), a thought provoking contradistinction was identified between the responses of Hulme and Crawford. Hulme advocates the theory of a soft skill prioritisation approach in the design of a proactive augmented workforce, stating that empathy is a crucial skill that computers lack, a notion that is echoed by World Economic Forum (2016) and Davies et al. (2011). On the other hand, Crawford reverses this perspective, believing computers are only as competent as their programmers and thus the harder technical skills such as coding should be prioritised. The literature of Gray (2016), the World Economic Forum (2016) and Davies et al. (2011) conflicts with Crawford's opinion, and thus it should be respectably considered as perhaps an inconsistent or outlying notion. Each perspective during the research process was reflected in the respective Ten-ES model answers. Thus confirming the assertions posed.

In conclusion, by considering the perspectives of Hulme and Crawford with those considered in the literature there are a number of direct matches and near matches (to within two allocations of each other) for the Ten-ES model conceptualized as part of the literature review (see table 2 below). As a result, the model is empirically informed and thus should be systematically incorporated into the evolution of JAM's future talent development programmes. Broadly speaking the softer skills are categorised higher in the rank order of importance, with those becoming narrower and harder being ranked lower, see table 4 below.

Table following on the next page

Table 4: Empirically Derived: Top skills needed in the asset management industry for the era of automation

Rank Order	Skills of Importance	Rank Order	Skills of Importance
1 (most important)	• Emotional Intelligence	6	• Judgement and Decision Making
2	• Creativity	7	• Complex Problem Solving
3	• Negotiation	8	• Service Orientation
4	• People Management	9	• Cognitive Flexibility
5	• Coordinating with Others	10 (important)	• Logical Reasoning

iii) The current existence of augmentation and how to enhance it

Presenting itself as a fascinating acknowledgement, Hulme declared that we as a society are already augmented, exampling that we cannot immediately access all of human knowledge without a machine (computer and the internet). Consequently this raises a compelling notion that civilisation should not perceive augmentation as a forward looking technology to prepare for. But rather that businesses are already engaged within the methodology. Thus to optimise its advantageous properties, management must evolve augmentation as opposed to create it, by way of creating faster and more natural ways to engage with the digital world thus propagating better decision making with agility. Hulme declared there are indeed tasks that computers cannot effectively perform such as interpreting the results of analytical processes with empathy based perspectives. For example, Hulme cited that some individuals will not approve of using RAs as their decisions may be perceived as unfair or unsympathetic, which as a result will likely always stimulate a demand for human ratification. Within this conjecture, Hulme believes there is a compelling augmentation opportunity to ensure a seamless transition process from machine to a human, thus quelling the individual's concerns and maintaining customer satisfaction. As a result, there is firm evidence for the notion of augmentation as a primary optimisation route as argued by Davenport (2015), and that an overemphasis of automative technologies is counterproductive given their empathic weakness as argued by Autor (2014). One meaningful concern that was not previously identified, during the investigation, was the issue of responsibility. Hulme indicated that if a machine was to independently make an inadequate decision, then the implementing firm would be liable for its error. However, by augmenting a human employee with the machine who ratifies all proposed automative decisions, the liability rests with that employee alone. Consequently, this presents an ethically challenging but credible strategy for firms, particularly those that are small and not cash rich, to reduce their overarching automative liability and exposure to monetary damages. In conclusion, we can surmise that augmentation is already largely present in the daily activities of our personal and professional lives. Management should recognise that organisations must now invoke a process of evolving this synergy, rather than supposedly creating one, in order to orchestrate an ever more seamless customer experience and increase operational efficiencies. The use of humans as mitigating individuals of automative liability is an ethical question that management should consider, against the cultural values of their organisation and potentially their legal responsibilities imposed by law.

<u>iv) Alliance with the option to acquire as the most effective strategy to onboard RA's</u>
The research conducted here affirms the notion that an alliance is the most appropriate choice to facilitate a RA centric hybrid digital platform. According to both Hulme and Crawford, a strategic alliance or partnership would be the most favourable approach, with Crawford going further to state that the second most appropriate option would be an acquisition and the third would be a DIY option. Crawford believes that if a firm has developed in their maturity and proved the value of their services, alliances are effective in preventing wasting monetary and other resources in discovering whether a technology will be of organisational use. Whilst supportive of the strategy Hulme did urge caution with arguably its most prominent risk, that being competitive advantage issues, which could arise from numerous firms using the same partner thus fabricating a lack of differentiation. Consequently, this adds favour to the notion of an alliance with the option to acquire later, which both Hulme and Crawford enthusiastically supported.

In conclusion, to acquire an RA capability it is recommended that JAM, and other asset management organisations, should strategically align or partner with a specialist firm in this field. Furthermore, the partner should demonstrate operational proficiency and ideally an option to acquire the partnering RA organisation, in order to develop a competitive advantage. Furthermore, organisations like JAM should implement a seamless transition process for customers who choose to abandon RAs in favour of an empathic human manager.

5. FUTURE RESEARCH

The potential to extend the results of this investigation through further research are pronounced in two key areas. There firstly is a providential opportunity to explore how precisely augmentation, between RAs and employees, can be nurtured in order to create faster and more natural expressions of engagement between employees, facilitating enhanced decision making. For example, analysis could be conducted into the properties of incorporating augmented reality technologies within an organisation's working environment, both in terms of facilitating a progressive method of completing occupational tasks and improving a firms value proposition. The second area presented for future research is an investigation into prospective strategic alliances with the option to acquire, between a large asset management firm, such as JAM, and a flourishing RA organisation in the approach to 2020. This builds upon the papers recommendations, and would compile an additional layer of academic knowledge that firms could utilise in their technological diversification.

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