How professionals adapt to artificial intelligence: the role of intertwined boundary work

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Abstract

The rise of artificial intelligence (AI) has generated extensive debates about the future of work in the professions. However, few studies take account of the potential for AI's disruptive effects to trigger robust defence by professionals of their interests and resources. By examining the adoption of AI in accounting and law professional service firms (PSFs), we show how professionals respond through *intertwined boundary work,* this being the process by which professionals respond to disruptions and protect interests and resources by engaging in multiple interdependent modes of boundary work. We also examine the way professionals collaborate with other groups as part of *intertwined boundary work*, and the implications for some key features of PSF organization. Our study reveals that the responses of professionals to AI are leading to new types of professional work and services. This means that rather than spelling the 'end of the professions', AI is leading to reconfigured forms of professional activity, jurisdiction, and PSFs.

Key words: artificial intelligence, professional service firms, boundaries, boundary work, accounting, law

Introduction

The latest developments in artificial intelligence (AI) have raised new questions for professionals about their exposure to change, and even to the risk of redundancy. For example, ChatGPT has demonstrated its ability to produce legal documents, leading to the law firm Allen & Overy adopting the technology in a chatbot that lawyers use when preparing client advice (see Financial Times, 2023). Data review/searching technologies, such as InFlo in accounting and Kira in law, are both automating some of the manual data review work previously completed by professionals and delivering big data-based insights that augment client services and change the advisory role of professionals as it becomes possible to provide new types of anticipatory consulting services. AI has, then, distinctive implications for professional work compared with earlier technologies such as knowledge management and decision support systems (Anthony 2021; Curchod, Patriotta, Cohen and Neysen, 2020; Kellogg, Valentine and Christin, 2020; Spring, Faulconbridge and Sarwar, 2022). Its growing sophistication and ability to interpret data, and not just facilitate its management, has led to predictions that the work of professionals will replaced (Deloitte, 2017; Guihot, 2019; Susskind and Susskind, 2015), or at minimum radically augmented by inputs from AI (Davenport and Kirby, 2016; Fleming, 2019; Pettersen, 2019; Raisch and Krakowski, 2021).

The effects of AI have also stimulated analyses of the reconfiguration of the organizations in which most professional work is done - professional service firms (PSFs). AI can change the modes of delivering services within existing firms and give rise to new challenger firms that adopt radically different means of production (Armour and Sako, 2019). As Kronblad (2020, p. 451) notes in relation to legal PSFs as one exemplar, AI spells therefore

"not the end of law…[but] entirely new ways to practice law, to organize, to package, and sell legal services".

Existing studies have, however, neglected the potential for AI and its disruptive effects to trigger robust and defensive responses that influence the way professional work and PSFs change. As Scott (2008, p. 219) reminds us, professionals are "the preeminent institutional agents of our time" because of the way they manipulate rules, norms and cultures to structure fields and societies, advance their own interests and protect resources. These interests and resources relate, in particular, to exclusive access to certain types of work through professional closure, a process whereby only certified professionals can produce and deliver services, such as accounting and legal advice (Boussebaa and Faulconbridge, 2019; Muzio et al., 2013; Noordegraaf, 2020). In particular, the role of *boundaries* in responses to AI is significant. It is widely recognised (Bucher, Chreim, Langley and Reay, 2016; Gieryn, 1999; Helfen, 2015; Suddaby and Viale, 2011) that interests and resources are maintained through boundaries. Boundaries are social constructions that create "sites of differences" (Abbott, 1995, p. 862) and "distinguish one group from another" (Comeau-Vallée and Langley, 2019, p. 3). They are used to "define a profession's access to material and non-material resources such as power, status and remuneration" (Bucher et al., 2016, p. 498). Suddaby and Viale (2011) argue that professionals respond to disruptions by recreating boundaries as attempts are made to "balance efforts to exploit current or commodified expertise while simultaneously extending the scope of professional jurisdiction" (Suddaby and Viale, 2011, p. 431). Specifically, professionals respond to disruptions through boundary work, this being the "purposeful efforts of professional groups and their members to influence the boundaries between professions" (Weber, Kortkamp, Maurer and Hummers, 2022, p. 2). The literature documents multiple modes of boundary work as existing boundaries are remade, or new

boundaries created as part of efforts to maintain and create new distinctions between groups and to protect existing and/or acquire new resources (Bos-de-Vos, Lieftink and Lauche, 2019; Bucher et al., 2016; Quick and Feldman, 2014; Zietsma and Lawrence, 2010).

There is, though, an important gap in existing boundary work research. As Langley et al. (2019, p. 729) note, to date the role of "intertwining" and "dynamic linkages between different types of boundaries" has not been theorized, despite empirical suggestions that such linkages may be important when significant disruptions occur that threaten core professional interests and resources. Studies have focused on theorizing change involving a single mode of boundary work and a single boundary distinguishing two groups, such as between doctors and nurses (Currie et al., 2012) or in-house and corporate accountants (Radcliffe, Spence, Stein and Wilkinson, 2018). Consequently, there is a lack of theorization of the cause of "sequences of ongoing, multi-sited boundary negotiations" (Glimmerveen, Ybema and Nies, 2019, p. 2) and of the effects of interactions between multiple modes of boundary work. There is a need for more focus on "relationships (not competition)" between forms of change (Santos and Eisenhardt, 2005, p. 503) and to theorize interactions and interdependencies as boundaries are simultaneously remade and created anew. In this paper, we therefore, pose the following question: *How do interdependencies between modes of boundary work emerge and affect the way professionals protect their interests and resources during periods of disruption?*

We address this question by drawing on data from an empirical study of the adoption of AI in accounting and law PSFs in England. Through analysis of how professionals have responded to AI and the way boundaries have evolved, we elaborate the idea of intertwining that Langley et al. (2019) hypothesize to be important. We do this by developing the new

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concept of *intertwined boundary work*, which we define as a process through which professionals respond to disruptions and protect interests and resources by engaging in multiple interdependent modes of boundary work. We show that *intertwined boundary work* results from: *opportunity ties*, when one mode of boundary work creates an *opportunity* for other modes that generate additional benefits for the group in question; and *necessity ties,* when one mode of boundary work *necessitates* other modes because of ripple effects that make the success of the first mode contingent on the enactment of other modes. We also identify the role of *recursive change reinforcement,* when one mode of boundary work consolidates another. Our theorization of *intertwined boundary work* is important as it uses insights from AI's disruptive impacts on accounting and law PSFs to advance understanding in three ways. First, it shows how professionals respond to major disruptions through interdependent modes of boundary work that together maintain interests and resources. Second, it explains what creates interdependencies between modes of boundary work and the triggers of the different modes. Third, the analysis provides one of the first empirically detailed accounts of the implications of AI and the boundary work it inspires for the organization of professional work and PSFs, in particular in terms of the new forms of inter-profession collaboration that become central to AI-enabled professional work.

Boundaries and boundary work

Boundaries are fundamental to conceptualisations of how professions protect their interests and resources. Symbolic boundaries create categorizations of people, practices and objects as inside or outside, legitimate or illegitimate, thus affecting the power and status of a group in a space. Social boundaries control access to resources such as work by defining who has

rights of access and who is excluded (Lamont and Molnár, 2002, p. 168-9). Together, symbolic and social boundaries create what Abbott (1988) calls the system of professions whereby the domains and associated interests and resources of different professions are defined and protected. For example, in the English context boundaries create a distinction between barristers and lawyers, defining the work each group can complete and its status in society (Abbott, 1988). Social and symbolic boundaries also separate professions from 'non-professions' (Freidson, 2001; Krause, 1996). For example, they distinguish pharmacists, who have the right to dispense drugs, from pharmacy assistants who can only manage the availability and delivery of drugs following pharmacists' directions and whose ideas about effective pharmacy practice are deemed illegitimate and are ignored (Barrett, Oborn, Orlikowski and Yates, 2012).

An important stream of research on boundaries focuses on their dynamic nature. Boundaries change as professionals respond to disruptions through boundary work to protect their interests and resources (Abbott, 2005; Gieryn, 1999; Hernes, 2004; Seabrooke and Tsingou, 2015; Suddaby and Viale, 2011; Muzio et al., 2013). Langley et al. (2019) identify three types of boundary work. The first type is competitive boundary work and "how people construct, defend, or extend boundaries to distinguish themselves" (Langley et al., 2019, p. 706). Second, collaborative boundary work "considers how people draw on, negotiate, blur, or realign boundaries in interaction with others" (Langley et al., 2019, p. 707). Configurational boundary work "considers how people work from outside existing boundaries to design, organize, or rearrange the sets of boundaries influencing others" (Langley et al., 2019, p. 707). Langley et al. (2019) also identify a number of different modes of performing each type of boundary work. These modes are summarized in Table I.

Insert table I here

Illustrating the competitive boundary work identified by Langley et al. (2019) are studies of adjustments to the frames (Werner and Cornelissen, 2014), meanings associated with distinction (Raviola and Norback, 2013) and justifications of boundaries (Hazgui and Gendron, 2015) as part of efforts to maintain existing boundary protections. Rhetorical claims are made by one group about their knowledge, abilities and thus superiority and distinctiveness compared to other groups to prevent the removal of and/or raise boundaries (Galperin, 2020; Lunkka, Jansson, Mainela, Suphonen, Meriläinen, Puhakka and Wiik, 2021; Werner and Cornelissen, 2014). Specifically, professionals make claims that focus on the ability of one group compared to another to synthesize information and address ambiguity (Abbott, 1988; Freidson, 2001), make context-sensitive and creative decisions (Pettersen, 2018), and reassure and empathize with clients in ways that generate trust and reassurance (Fleming, 2018). Claims are made through structures such as professional associations, regulators and government consultations (Bucher et al., 2016) as well as through intra-organizational tactics, such as the way groups within advertising agencies (Kellogg et al., 2006), hospitals (Lunkka et al. 2021) and newspaper publishers (Raviola and Norback, 2013) distinguish themselves from competitor groups within the organization. Indeed, as Feyereisen and Goodrick (2019, p. 2) note in relation to intra-organizational boundary work in medical schools, "organizational decisions play a critical role in…reinforcing field-level professional jurisdictional outcomes".

Demonstrating the importance of collaborative boundary work, studies of healthcare professionals reveal how doctors protect their resources by recurrently defending boundaries but also by promoting the role of inter-professional collaboration across boundaries, linking doctors to other professional groups such as nurses and physiotherapists and 'non-professionals' such as counsellors and other therapists (Comeau-Vallée and Langley, 2019). For example, Currie et al. (2012) outline how changes to UK National Health Service structures led doctors specialising in genetics to both seek to protect their work by recreating boundaries that distinguish their activities from those of other doctors, and to develop collaborations with specialist genetics nurses. However, studies of healthcare also reveal how collaborative boundary work often coexists with configurational boundary work. Adler and Kwon (2013) outline how changes associated with the implementation of clinical guidelines strengthened interdependencies between doctors and other groups as definitions of ways of working inscribed a role for collaborators such as nurse practitioners, social workers and therapists (see also Apesoa-Verana, 2013; Wilhelm, Bullinger and Chromik, 2019). Such changes were configured by managers in hospitals as they sought to manage the effects of boundaries on collaboration and the implementation of guidelines (see also Lunkka et al., [2021] for a similar example of the role of configurational boundary work). Consequently, studies have begun to ask questions about whether it is only professionals that benefit from collaborative and configurational boundary work, for example through the passing-on of lower-skilled 'scut work' to 'non-professionals' (Huising, 2015), or whether 'non-professionals' or newly emerging occupations/professions might also benefit when they secure a new strategic role within PSFs as a result of their collaboration with professionals (Galperin, 2020; Huq, Reay and Chreim, 2017; Kellogg, 2022; Truelove and Kellogg, 2022).

Langley et al. (2019) thus note that, during periods of boundary work, boundaries may be reproduced and strengthened through modes associated with competitive boundary work, but also simultaneously diluted through modes associated with collaborative boundary work and reorganized through modes associated with configurational work. A good illustration is research on the impacts on boundaries of the introduction of AI in healthcare. This suggests that AI requires multiple changes to boundary claims and collaborations between different expert groups (Rowe, Nicholls and Shaw, 2021). For example, radiologists, one of the healthcare professionals affected earliest and most significantly by AI, have adjusted their boundary claims because other 'non-professional' groups, without radiology qualifications and training, can now use AI to do the diagnostic work that was previously the preserve of radiologists. Studies report modes of boundary work that in table I would be categorized as defending, negotiating and coalescing as part of efforts to carve out a new role for radiologists alongside other 'non-professionals' (Hardy and Harvey, 2020). Zietsma and Lawrence (2010, p. 214) describe how such multidimensional change can involve "multiple, often conflicting actions by actors" as boundaries are simultaneously strengthened, diluted and even removed. Existing literatures tell us little, however, about the causes and effects of coexisting modes of boundary work, resulting in unanswered questions about when and how coexistence allows effective responses to significant disruptions to professional interests and resources.

Moreover, it is not just the coexistence of different modes of boundary work that needs attention. Theorization of what Langley et al. (2019) call 'intertwining', whereby connections emerge between different modes of boundary work, is crucial for advancing understanding of how professionals respond to threats to their interests and resources. Intertwining is different to coexistence because the different modes of change are conceptualized as interdependent and relational, rather than being conceptualized as

happening in parallel and independently. Theorizing intertwining is also important because it seems likely to play a distinctive role during periods of acute disruption and threat to interests and resources.

Methodology

Context

We draw on original empirical analysis of how accountants and lawyers in England working in mid-sized PSFs (with revenues of £25m-£250m) and providing services to corporate clients responded to the introduction of AI into their work between 2018 and 2020. Accountants and lawyers are ideal to explore the dynamics of boundaries because of the established status of the two professions and the PSFs they operate in (Krause, 1996) and the recognised use of boundary work to maintain status. For instance, accountants have deployed boundary work to respond to changes that threaten their jurisdiction, such as re-regulation affecting the consulting activities of the largest international firms (Greenwood and Suddaby, 2006; Radcliffe et al., 2018). Lawyers have deployed boundary work to facilitate entry of their firms into new markets such as China (Liu, 2008) and to defend themselves against regulatory reforms targeting closure projects (Ackroyd and Muzio, 2007).

We consider accountants and lawyers together not only because both groups have established status and PSF organizational forms, but also because we discovered that AI's impacts generated similar responses in the two contexts (see also Spring et al., 2022). As such, consideration of the two together allows us to identify common patterns and processes in terms of boundary work. At the outset, we did not expect such a degree of similarity.

Accounting and law firms differ in terms of scale (the former tend to be larger than the latter) and the fundamentals of work (more numerical in the former, textual in the latter). However, our research showed that because they share some key professional work and organization features, comparison is possible and insightful. In particular, both have the characteristics of what von Nordenflycht (2010) calls a 'classic PSF' – high knowledge intensity and a professionalized workforce. In addition, both adopt the partnership model of organizational governance, which has implications for ways of working and managing, as well as career paths (Empson and Chapman, 2006). Together, these two common features have implications for how professionals and PSFs respond to AI, and how boundary work occurs: change is driven by a workforce with high degrees of autonomy and organizational structures designed to support this autonomy (Faulconbridge and Muzio, 2008, 2013). Moreover, as we outline below, the use characteristics of AI in accounting and law PSFs also share some common features.

The introduction of AI in accounting and law PSFs is a particularly intriguing case because it has been associated with discourses proclaiming the transformation of professional work and the replacement of humans by AI-generated analysis (e.g., Susskind and Susskind, 2015; Guihot, 2019), something that has triggered defensive responses that are indicative of boundary work. For example, Markovic (2019) describes responses to 'robot lawyers' that involve re-emphasising the distinction between routine and non-routine work, the skills needed to complete the latter being positioned as something uniquely possessed by human lawyers. Issa, Sun and Vasarhelyi (2016) outline how accountants position AI as providing new data resources that allow humans to focus on the high-value task of interpretation that has always defined the professional's work. As such, the responses of

accountants and lawyers to AI provide a revelatory case (Yin, 2009), allowing us to understand in detail responses to significant disruptions that threaten interests and resources.

A number of commercial providers of AI-based tools for accounting and law now exist. Table II summarises key examples of AI tool categories and their impacts on accounting and legal work. It highlights how several widely used AI tools, developed by commercial providers and licensed to accounting and law firms, reconfigure some of the core tasks associated with professional work. In particular, the impacts on accounting and law are defined in part by a key feature of AI: its ability, following a period of training, to both continuously learn from the datasets it analyses (known as machine learning) and to apply logic to analyses in ways that go beyond what can be done by rule-based systems using if-then type logics based on the codification of human expertise. The result is that AI provides analysis and interpretation that generates new kinds of insight into client problems and new processes of producing client advice. Disruption occurs, in particular, in relation to data collation and analysis work, such as audit sample selection in accounting and document review in law. AI tools, through their training and learning, can analyse datasets and reach conclusions about areas of risk that are likely to require action or need consideration when providing advice to the client, thus changing the role of human professionals in the advice production process.

Insert table II here

As such, AI affects some of the crucial early-stage data analysis work of accountants and lawyers, with three forms of impact that are very different to the impacts of previous

generations of technology. First, professional work changes as some tasks are reconfigured by AI, but also some new tasks emerge. In particular, the process of data analysis that informs diagnosis, interpretation, and treatment (Abbott, 1995) is changed as AI completes some of the diagnosis-related analysis. Professionals do less manual data assembly and initial analysis work but take on new tasks associated with interpreting and acting on the outputs of AI systems. Second, the use of AI has implications for career paths. In accounting and law firms there is now a new cohort of technologists that are responsible for implementing and using AI systems. These individuals, who may or may not possess accounting or legal training, operate alongside accountants and lawyers, and have career paths that challenge some of the existing structures associated with partnerships. In particular, when AI is embedded into accounting and law firms, questions about who progresses to partnership (e.g., only those with accounting and legal qualifications?) are raised by the increasingly central role of technologists in the delivery of accounting and legal services. This challenges some of the fundamental organisational structures and assumptions governing PSFs (on which see Empson and Chapman, 2006; von Nordenflycht, 2010; Smets et al., 2017). Third, AI can lead to evolutions in the business models of accounting and law PSFs, in terms of what services they offer clients and how they are delivered (for an overview see Armour and Sako, 2020; Spring et al., 2022). The data analysis abilities of AI tools allow firms to offer clients new forms of advice, based on insights from large datasets relating to a client's business operations.

The impacts outlined above emerged because of the growing use of AI in accounting and law in the second half of the 2010s. In this period, further enhancements in computing power transformed the theoretical possibility of many AI developments into practical possibilities. This generated a rapid proliferation in start-up companies offering AI-driven solutions – for example Kira (2020) identified US$1.2billion of investment from 36 leading

legal tech companies in 2019. In turn, the professional associations representing accountants and lawyers in England – the Institute of Chartered Accountants in England & Wales, and the Law Society respectively – launched their own reviews designed to identify both ways of using AI and the impacts on work and firms (see Law Society, 2018; ICAEW, 2018). Studying the responses of accountants and lawyers to the impacts of AI during the late 2010s is, therefore, a valuable way of extending theorizations of boundaries and their change during periods of acute disruption.

Data and methods

We conducted research between 2018 and 2020, designed to develop a "contextually rich and detailed account" of responses to the effects of AI in accounting and law firms, the intention being that "the specific details that are provided and their contextual grounding do most of the explanatory work" (Cornelissen, 2017, p. 371). The intention of our analysis was to engage in theory elaboration whereby an inductive approach allowed us to compare responses of accountants and lawyers to already documented modes of boundary work, and then use the comparison to refine and extend theorizations. Existing studies have identified two methodologies for collecting data relating to boundaries in the professions and their change. One approach adopts a historical archival approach and uses secondary data in the form of reports, committee minutes and media archives to reconstruct, using discourse and other linguistic approaches, responses to disruptions and the implications for boundaries (e.g., Currie et al., 2012; Bucher et al., 2016). A second approach develops in-depth qualitative analysis using primarily interviews with key actors in the organizations invoking and affected by boundary change (e.g., Hazgui and Gendron, 2015; Bos-de-Vos et al., 2019), often

triangulated with analysis of relevant documentary materials from professional associations and other field-level actors such as the media that provide further evidence to support insights from interviews. In both approaches, the aim is to identify the responses of professionals to disruptions, the claims made as they respond and the process of constructing and defending boundaries (Currie et al., 2012; Galperin, 2020; Lunkka et al., 2021; Werner and Cornelissen, 2014). We adopted the second approach (interviews supported by document analysis) given the recent increased impact of AI and, therefore, the limited amount of secondary data available that documents change to boundaries. We focused on how accountants and lawyers responded to the effects of AI, examining how actions, while not always planned as a boundary work strategy, ultimately resulted in changes to boundaries. This is in line with studies that document the importance of change through everyday practices and hence the need to study not only strategically planned responses but also the emergent effects of pragmatic actions (Chia and Holt, 2009; Smets, Morris and Greenwood, 2012; Smets and Jarzabkowski, 2013).

The research progressed in two stages. Table III provides further details of the data sources examined across the two stages. In stage one, a survey of the nature and potential impact of AI was completed, using documentary materials (876 reports and articles) and 34 scoping interviews with representatives of accounting and law firms and technology providers. Documentary materials were drawn from Accounting Today and Legal Week (two professional magazines) by searching using the term 'artificial intelligence' and reviewing the articles listed. Interviewees were chosen because their firm was known (via reports in the media or information on their website) to be relatively advanced in the use of AI. We were already aware from studies of the impacts of earlier generations of digital technology (e.g., Barrett et al., 2012; Nelson and Irwin, 2014) that one potential response involved changes to

boundaries. Thus, as well as more general questions about the use of AI, we included in the interview protocol questions about the effects on and changes to boundaries. Analysis in stage one involved multiple members of the project team reading the documentary materials and transcripts of the interviews conducted. Nvivo computer software was used to code the data using 'manifest' (Berg, 2004) codes agreed by the readers. These codes identified recurrent articulations in the data relevant to our interest in AI. First stage manifest codes were: AI projects and tools; AI development and implementation; factors affecting AI adoption; potential changes to accounting and legal services. This manifest analysis allowed us to document, in an initial case narrative, the potential of the new technology to alter the work of accountants and lawyers and the potential implications for boundaries. We then used insights from this stage to develop the focus for the second stage of research, with the purpose of zooming in on and testing for additional causes, processes and effects of change.

Insert table III here

The second stage involved a series of 51 interviews with key actors in accounting and law firms with ongoing AI implementation projects. Interview targets were identified from data collected in the first stage, supplemented by a review of the websites of the 100 largest accounting and law firms in England to identify those claiming to be adopting AI. The second stage interviews deepened understanding of themes identified in stage one and teased out more details of the impacts on and responses of professionals. Adopting a 'follow events forward' and 'trace backwards' (Langley and Tsoukas, 2010) approach, interviewees were

asked to illustrate their answers by looking backwards (at changes within the past 12 months) and through reference to the effects of ongoing efforts to adopt AI. The interview questions focused on both pragmatic (actions to get the job done using AI) and strategic responses (actions intended to protect interests and resources) and sought explanation of the claims used to justify the responses. Analysis of second stage interview data initially followed a similar approach to the first stage. The same manifest coding structure was used and then supplemented with new codes relating to additional themes emerging from the data. The new codes were: impacts on roles; duties and everyday work; claims made about professional work in response to AI; forms and processes of change (including to boundaries); outcomes and impacts on professionals and PSFs.

We then moved into 'latent' coding (Berg, 2004) which involved interpreting the data in each manifest code (combining stage one and two data) to identify interrelated patterns and processes relevant to boundary work. Latent codes were formed by aggregating across manifest codes where appropriate. We began by adopting the framework of Langley et al. (2019) and coded for the types and modes of boundary work (see table I). This revealed a recurrent role for four of the modes noted by Langley et al. (2019): *defending, creating, negotiating* and *coalescing.* We then compared the insights gained into these modes from our data with insights from the literature. This allowed us to identify new insights not explained in existing theories that related both to the details of responses to AI and, most significantly, forms of intertwining between the four modes of boundary work. Specifically, we identified the role of two underlying *ties* causing intertwining: *opportunity ties*, when one mode of boundary work creates an *opportunity* for other modes that generate additional benefits for the group in question; and *necessity ties,* when one mode of boundary work *necessitates* other modes because of ripple effects that make the success of the first mode

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contingent on the enactment of other modes. We then used data in the latent codes on the four modes of boundary work and two ties to build our theoretical model of *intertwined boundary work*. Table IV provides illustrations of the data identified for each of the latent codes.

Insert table IV here

AI and boundaries

Defending

The initial response to the impacts of AI was focused on maintaining the status quo in terms of boundary protections. Accountants and lawyers engaged in what Langley et al. (2019) call *defending* - a competitive mode of boundary work designed to repair boundaries (see table I). AI triggered *defending* because it challenged social boundaries and, specifically, the restriction of access to certain types of work in firms to qualified (human) accounting and law professionals.

Defending involved focusing on what AI could not do, rather than focusing on what it could do. The goal was to re-emphasize the distinctive role of human professionals and the need to protect their work. For example, one law professional suggested that *"there's an element of the professional judgement call that no machine can ever do"* (Law firm Partner). The claims made as part of a defensive response focused, in particular, on a key strength but also weakness of AI: its ability to deliver efficiencies relating to early-stage data collation tasks that involved basic interpretation and judgment. As one interviewee noted:

"It's all about getting to the information or to the decision quicker and then the lawyer

doing the sense check over it" (Law firm Partner).

As such, *defending* was possible because the effects of AI, whilst disruptive, left open

opportunities to repair existing boundaries. However, to succeed, it did require the *adjusting*

and restating of claims – this being a mechanism that involved the reworking of claims that

supported a boundary distinction between professional and non-professional work within

accounting and law firms.

Adjusting of claims involved a strategic move by accountants and lawyers whereby

they relinquished claims to rights over certain types of work. They relinquished claims

because they recognised that AI-driven systems, and those skilled in their use, were more

quickly and more accurately able to complete some tasks previously undertaken by

professionals. *Adjusting of claims* in accounting involved accepting and even justifying the use

of AI for certain tasks through assertions such as, it "*reduces the number of hours they*

[accountants] spend on the low-value tasks such as building Excel models" (Accounting firm

technologist) and "*takes away that mundane manual work*" (Accounting firm operations

officer). For example, in accounting firms, AI-driven packages such as InFlo allowed the

analysis of transaction samples during an audit. This would previously have been completed

by a junior accountant using data in a spreadsheet, their task being to browse each

transaction in a sample (a row in a spreadsheet) and spot transactions that might be

categorised as problematic according to set criteria. AI-driven systems, configured with risk

profile data, could complete such tasks without the input of an accountant, and more quickly

than human accountants using larger samples. This allowed greater scrutiny of a company's

activities. In law, similar *adjusting of claims* occurred. AI-driven packages such as Kira used

natural language processing to identify potentially problematic or pertinent clauses in contracts. Previously, junior lawyers would have been tasked to review documents manually, using pen and paper or word processing/PDF software. The use of AI systems to conduct such work was framed as legitimate as they allowed lawyers to avoid sitting "*in a meeting room surrounded by 100 boxes of documents and read[ing] every word in everything*" (Law firm partner). As a result, AI's main contribution, and hence the justification for its use, was to make "*the process more efficient*" (Law firm technologist).

Table IV provides more details about the way *adjusting claims* resulted in some tasks being defined as 'non-professional' and legitimately completed using AI. Claims about the legitimacy of using AI were developed and accepted, since the tasks affected were typically associated with lower-level data analysis (see table II) that provided the basis for the more advanced interpretation, judgement and contextualized decision-making that professionals emphasized as their distinctive capabilities. Hence, professionals showed limited resistance to the delegation of some early-stage tasks to AI systems and to non-accountants/lawyers designing/deploying such systems because it had minimal impact on claims that were fundamental to successful boundary defence. One interviewee justified the role of AI and the willingness to delegate work to it as follows: "*it's basically admin, it's not being a lawyer*" (Law firm innovation manager). An accountant offered a similar justification:

> "*you'll have lower-grade people dealing with the front end, so that might be collecting the data from clients, dealing with the lower-grade areas. The information will then be sucked into the technology and then out, and there'll be people that look after the technology and then it will be sucked out the other end to the senior consultants to go*

and deliver the added value or to interpret what's coming out" (Accounting firm partner).

Nonetheless, a second mechanism, also crucial in *defending,* was the simultaneous *restating of claims* about the importance of protecting certain types of work. *Restating of claims* occurred in relation to work that required more advanced judgment, context sensitivity, ambiguity tolerance and bespoke client-tailored decision making, something that has always been important in defining the abilities of professionals (Abbot, 1988; Kronblad, 2020). AI and the individuals skilled in its design and use (usually referred to as technologists) were characterised as unable to replicate the distinctive skills of accounting and law professionals when advanced analysis and decision making was needed. Typical of the *restating of claims* were comments such as: *"it's not supposed to be 'Computer says yes or no' kind of thing, you still have to use your legal skills"* (Law firm partner), and *"accountancy is numbers and computers are very good with numbers. Rules are rules, computers can manage those. The bit left to deal with is those nuanced decisions"* (Accounting firm operations officer). Hence, accountants and lawyers protected their privileges through the *restating of claims* about what they viewed as the most significant work for professionals. For example, one accountancy professional argued that professionals should not *"worry about the fact that this chunk of your role has disappeared [but] concentrate on the fact that there's a lot more good stuff that you can actually now deal with that helps the clients a lot"* (Accounting firm operations officer). The 'good stuff' referred to here is the judgment-related work professionals claimed they were uniquely positioned to complete. As a result, there was recourse to the idea that years of training and experience matter (*"a human is still needed for that judgement call"* (Accounting firm partner)) and that the guidance of a professional remains pivotal (*"the nuanced thinking and judgement that the client wants"* (Law firm managing partner)). This

allowed the dismissal of any suggestion that a non-professional and/or AI system could replace professionals. One lawyer summarised the situation as follows:

"AI solutions, whether that's in e-discovery, M&A [Mergers & Acquisitions] due diligence or even contract review, will review large amounts of data for you and summarise it, but it doesn't…they don't provide legal advice" (Law firm managing partner).

Restating claims reinforced, then, the idea that boundaries should protect the work of professionals. It was also partly relational in that it referenced *adjusted claims* by accepting the relinquishing of some work. Using AI for early-stage analysis tasks was framed as allowing professionals to:

"spend those five hours [usually spent on early-stage analysis] on more strategic thinking than actually reading through a load of documentation…so I'm going to be much more effective" (Law firm managing partner).

This connected to a wider narrative about the potential for AI to create more time for focusing on the 'good stuff' described above. Claims were made about AI allowing "*lawyers to focus on the true reason why they're lawyers…being able to work through the more difficult and more challenging pieces*" (Law firm technologist) and allowing about accountants to *"make that value judgement call"* (Accounting firm operations officer).

Overall, then, *defending* as the initial response to the effects of AI, and as a form of what Langley et al. (2019) call competitive boundary work (table I), sought continued boundary protection for key parts of accounting and legal work, despite the disruptive effects of AI. It was important as it allowed professionals to re-secure, through the maintenance of a

boundary, a distinctive and protected role for their work in accounting and law firms, albeit alongside AI and as a result of the relinquishing of some tasks to non-professionals. The partial redrawing of boundaries through *adjusted claims*, and the placing of some work (low-level data collation and the review work that AI can conduct) outside of the boundary protecting the jurisdiction of accountants and lawyers was important, as it interacted with the *restating of claims* and helped to ensure the continued exclusion of non-professionals from other key forms of work, thanks to the differentiation it created between AI-enabled and human professional work.

Creating

Accountants and lawyers also responded to the effects of AI on boundaries through what Langley et al. (2019) call *creating* (see table I). However, whereas Langley et al. (2019) associate *creating* with new groups that seek to carve out a domain for themselves, accountants and lawyers deployed *creating* when they spotted the potential for existing protections to be strengthened through greater domain reach.

Creating involved a key mechanism, the *defining of new domains*, which responded to AI by exploiting the technology to generate new claims about the domains that accountants and lawyers should occupy and protect through boundaries. The *defining of new domains* was made possible by the ability of AI-driven systems to analyse datasets that were previously too costly or slow to review (see table II), the data analysis then being used by professionals to offer new forms of advisory services relating to a range of client concerns. For example, in accounting firms, the ability to review one hundred percent of a firm's financial transactions, rather than a sample, generated new opportunities. It allowed the detection of patterns

relating to who processed transactions, when and using what account codes, such insights then allowing advice to be given to clients about ways of improving work practices in the accounts department. Similarly, in law, the ability to efficiently review large datasets allowed more pre-emptive advisory work, such as conducting reviews of all of a client's contracts with suppliers to allow advice to be given about risk profiles or opportunities for contract renegotiations. Previously this would not have been possible as most clients, who often have contracts dating back decades and/or inherited as part of historical mergers, would not have been willing to invest the time and money needed for a manual review by a lawyer. Moreover, outside of the largest accounting and law firms (such as the Big Four and Magic Circle respectively[1]), engagement in advisory work was limited before the arrival of AI because of the absence of the scale needed to invest in human resources to complete the advisory related research and analysis that AI can now partly facilitate.

Consequently, the insights gained from AI-driven analysis allowed, in more and more accounting and law firms, a process of *defining of new domains* that led to the construction of boundaries around new domains of advisory work. As one interviewee described, firms "*can do work that we never would have been able to do*" (Law firm operations officer). In particular, as one interviewee noted, new narratives emerged about firms using "*tech as much as we can so that we can move from being a compliance-focused firm to an advisory-focused firm*" (Accounting firm managing partner, emphasis added). Accountants and lawyers began to focus on "*what else can you do…the wider business services are more and more integral and part of our offering…data's the new oil*" (Law firm partner). For example, in accounting, interviewees commented upon how:

"we are able to add more value to clients…staff just get redeployed into different areas of work and I think the compliance piece will be devalued and the consultancy piece will be valued at a far higher figure" (Accounting firm partner).

The reliance on insights from AI when *defining new domains* meant that *creating* was the result of an *opportunity tie*. The *adjusted and restated claims* made by professionals as part of *defending* (which legitimated AI's adoption for certain types of work) provided an opportunity because they were the basis for and were referenced in efforts to *define new domains*. For example, lawyers justified their new advisory work by claiming that *"lawyers using AI will always be better than lawyers on their own or will always be better than technology on its own"* (Law firm managing partner). This link to *adjusted and restated claims* was important because, in many cases, efforts to *create* boundaries targeted domains previously occupied, albeit without any successful attempt to close them off with boundaries, by other groups and firms such as consultants and organisational development specialists. At the time of our study, little competition had arisen because of the distinctive claims of accountants and lawyers about their firms' new abilities, and specifically the emphasising of the need for both the data from AI and expertise of accounting or law professionals to deliver the new advisory services. As one interviewee put it, the role of the professional is to examine *"what the machine is going on about…we'll make that value judgement call"* (Accountancy firm partner). Providing training services for clients is an insightful example. For one firm this involved analysing trends in employment disputes generated by data collected from the client about all their disputes, and then providing managers in the client firm with training designed to address the root cause of the problems and prevent legal action from employees. As an interviewee noted:

"we've got a wealth of data now which we're able to take to the client and say ok the end of the first year these are the patterns we've seen in your business…And on the back of that…We have a training advisory service which we've built which also allows us to charge clients for training" (Law firm technologist)

Creating is, then, important because it provided a response to a new threat that sought to move beyond the status quo. It achieved this through the *defining of new domains* in a way that enabled the *creating* of social boundaries around new types of work, thus strengthening the position of the firms in question. However, crucially, *creating* resulted from an *opportunity tie*, being partly enabled by the *adjusted and restated claims* deployed as part of *defending* existing boundaries.

Negotiating

Our analysis also revealed the role in responding to AI of what Langley et al. (2019) call *negotiating* (see table I), this being a collaborative form of boundary work that involved finding ways to cooperate with other occupational groups. *Negotiating,* and the claims associated with it, was triggered by recognition that, in addition to approaches focusing on securing distinction and the exclusion of other groups, some new groups within accounting and law firms became important allies.

In both accounting and law firms, *negotiating* involved establishing cooperative relationships with a new group of technologists. Technologists were individuals able to use AI systems to conduct data analysis. The emergence of technologists meant, for instance, the development in law firms of *"a dedicated team whose only job is to use Kira [an AI system],*

that's it, putting the documents in, and then the output's given to the lawyers" (Law firm partner). Crucially, while the new group of technologists sometimes had accounting or legal training, they could equally be data analysis and/or AI computing specialists. They rarely held live practising certificates and did not have direct responsibility for client advisory work and, in turn, billings. As such, they were a group that would usually be excluded from involvement in tasks defined as professional work. However, *negotiating* involved the classification of technologists as co-operators and acceptance that the group would have access to certain aspects of accounting and legal work because they could provide inputs that were valuable for professionals and their clients.

Negotiating was made possible through the mechanism of *boundary bridging* which involved developing claims that legitimated relationships with technologists and the building of bridges to link their domain with the protected domain of professionals. Hence professionals made claims about *"the increasing need for non-lawyers to support lawyers because of technology"* (Law firm technologist), and how *"20% of the people that are coming into the business need to be data scientists"* (Accounting firm partner). Underlying such claims was a narrative about the importance of the new skillsets that technologists possessed: *"being able to use technology well and being creative in how they can use technology"* (Law firm technologist) was increasingly framed as crucial in accounting and legal work. Professionals thus framed *boundary bridging* as legitimate because it was in the interests of accountants and lawyers and allowed them to leverage AI through the skills of technologists.

Boundary bridging emerged as a result of a *necessity tie* - changes associated with *defending* and *creating,* described earlier, made collaboration with technologists and changes to boundaries to facilitate this necessary. As described earlier, the skills needed to complete

analysis using AI are different to those of accountants and lawyers, and more associated with data analysis and management. Indeed, there was overt recognition that accounting and law professionals are *"not that good at project management, they're not that good at cost management, they're not that good at technology"* (Law firm operating officer). It was, therefore, perceived as necessary to engage in *boundary bridging* to ensure that the approaches to *defending* and *creation* described earlier succeeded. For example, *boundary bridging* led to technologists attending client-facing meetings. Traditionally, meetings with clients were seen as sacrosanct and akin to a doctor-patient relationship, with only a restricted group of qualified professionals allowed to be in attendance. However, *boundary bridging* changed this to ensure the newly framed role of professionals working alongside AI could be effectively explained to clients. One interviewee explained how technologists are now:

> *"invited to client relationship meetings…something that five years ago would be unheard of [because] our clients really want to know 'How are you going to [use technology to] add value?'"* (Law firm technologist).

Boundary bridging as a collaborative type of boundary work was, then, a response to an emergent need for professionals to cooperate with other occupational groups by giving them access to some areas of work and by allowing them to participate in some professional activities. As such, *boundary bridging* involved the development of claims about the role of technologists that changed social boundaries. It was motivated by *necessity ties* as *defending* and *creation* responses relied on inputs from technologists and meant that bridges were needed. Professionals thus drove *boundary bridging* to enable them to 'get the job done' (Smets et al., 2012).

Coalescing

In addition to changes to social boundaries that adjusted access to work and jurisdictional resources, changes also occurred to symbolic boundaries determining who was an insider or outsider to key spaces, and specifically the partnership and management team, within accounting and law firms. These changes involved what Langley et al. (2019) describe as *boundary coalescing* – a configurational type of boundary work that involved boundaries between existing spaces being blurred and the spaces integrated to achieve new goals (see table I). *Boundary coalescing* was driven by senior managers of accounting and law firms (usually managing and senior partners) who developed rhetoric and structural tactics to support change. They invoked change by using the opportunities created by their positions within the firms, but also by using their political capital and skills of persuasion that others have described as crucial when leading a PSF (Empson, 2017).

In accounting and law firms, *boundary coalescing* had important implications for one of the long-recognised features of PSFs, the partnership. As noted above, the partnership model, in which firms are co-owned by a group of senior professionals, is a defining feature of accounting and law firms. Indeed, until 2013, regulations in England for law firms prohibited non-professional partners. In the firms studied, senior and managing partners had or were in the process of changing the conditions for entry into the partnership, with the explicit intention of finding ways to incorporate technologists, legal process managers and operating officers. In one law firm, this resulted in partners that were:

> *"data scientists...product managers who are [also] client-facing, a head of research and development who's client-facing"* (Law firm operations officer).

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In one accounting firm, an interviewee described how:

"What this firm has done is turn the model on its head and put the tech people at the top of the pyramid and put the accountants lower down…it's led to a number of very interesting conversations in the firm" (Accounting firm operations officer).

Boundary coalescing occurred through the mechanisms of *redefining boundary exclusions*, this requiring alterations to definitions of insider/outsider status. For partnerships in accounting and law firms, this meant changing the rules defining who, through promotion, could become an insider and a named partner. Rules were changed in a variety of ways, ranging from full amendments allowing formal partnership status, through to changes to allow more informal membership through titles such as Principal which signified the right to input into partnership decision-making when legal structures did not allow formal membership (e.g., Alternative Business Structure law firms can have non-lawyer partners whereas Limited Liability Partnerships cannot).

Facilitating the entry of technologists into the sacrosanct space of the partnership by *redefining boundary exclusions* was seen as necessary because of technologists' increasing role as collaborators in the production of advice, as outlined earlier. In particular, the importance of a *"much flatter structure"* that recognises that *"it is a team of people who deliver"* was noted, and therefore partnerships should include *"technology people, legal and project managers"* (Law firm technologist). Moreover, the importance of data that is properly organised, and of adherence to processes that allow AI's capabilities to be leveraged, further promoted changes to facilitate the role of technologists within partnerships. Proper organisation of data is needed because, as one interviewee noted, *"if the data isn't standard*

somebody has to spend a lot of time mapping the data through, that is highly inefficient" (Accounting firm operations officer). As another interviewee summarised:

> *"data interpretation is only as good as the data that's actually in the system, so you have to have a robust process of getting source documentation into the system"* (Accounting firm partner).

A report in a legal magazine similarly observed that *"The potential for cross-matter application is greatest where the documents are most standardised"* (South Square Digest, 2019). Consequently, it was noted that it was important for technologists to *"train them [professionals] on how to use a data extraction platform, what that means, how they change their working"* (Law firm operations officer). As a result, although those holding the role of technologist often had previous careers outside of the accounting and law professions, in manufacturing or project management, they gained authority to operate within and exert managerial control inside the boundary that defines the professional partnership. For example, one head of legal innovation described the kind of change he was trying to drive in the behaviour of lawyers:

> *"Historically, law firms' management…only manage to two things: one, quality of the work…And then, the other thing they do is manage the figures, [chasing] the bills and that kind of stuff. So, we're trying to get our team managers to think very differently about what their role is"*

As such, *boundary coalescing* was triggered by circumstances that rendered existing organizational boundaries, and the protection they provided, an impediment. Hence, the change is another example of a *necessity tie* because it resulted from the need to change boundaries that had become problematic in the context of other changes associated with

defending, creating, and *negotiating*. However, changes to partnerships had important implications. There were impacts on the management of work. Professional work is typically defined by autonomy over means (how work is done) and ends (the standards that advice is judged against) (Greenwood, Hinings and Brown, 1990; Freidson, 2001). This means professionals are free to develop their own methodologies, peer review and sanction processes for poor quality work through the partnership as a self-governing entity. In the firms studied, *redefining boundary exclusions* had begun to permit technologists to take on the role of process/innovation managers, often alongside chief operating officers, meaning they could legitimately challenge professionals' work practices. The change is significant as, historically, only professionals (accountants in accounting firms and lawyers in law firms), elected to management positions, were legitimate controllers of means or ends within the partnership. The process of *redefining of boundary exclusions* thus involved managing partners and senior partners arguing for the legitimacy of process/innovation managers and chief operating officers actively managing professionals, for example by *"asking the question [of professionals] 'why are you deviating from the protocols supplied in the last 30 cases?'"* (Law firm managing partner). Changes to partnerships and management control to enable greater input from technologists ultimately required the consent of partners, who usually had to approve the changes through a vote. Such changes were somewhat controversial but were usually approved because the partners benefited from *redefined boundary exclusions* as a result of what they facilitated in terms of *defending* and *creating.* As one interviewee summarised:

> *"Now, clients are saying, 'Let me have a look at the implementation plan for this*
> *project.' You need a project manager who says, 'Here's the implementation plan, and*
> *my job is to be responsible for making sure all the resources are in the right place at*

the right time for the right budget,' which wasn't a question you were asked a decade

ago" (Law firm partner).

Boundary coalescing as a configurational type of boundary work was, then, important because it responded to organizational needs created by the other modes of boundary work described earlier which made technologists increasingly important, i.e., it resulted from a *necessity tie*. It then also led to technologists having new inputs into managing professionals' ways of working, which consolidated their new role established through *boundary bridging*.

Intertwined boundary change

Our analysis shows how, in accounting and law PSFs, the disruptive effects of AI technology were responded to through boundary work. We identified (see figure 1) the role of four modes of boundary work documented previously by Langley et al. (2019) (*defending, creating, negotiating, and coalescing)*, new insights into what triggers such boundary work in PSFs, and the mechanisms associated with each. In this section, we focus less on the specifics of each type of boundary work, given their correspondence with the types outlined by Langley et al. (2019) (see table I), and more on the previously untheorized role of *ties* (see figure 1) between different modes of boundary work that constitute the process we call *intertwined boundary work* – this being a process through which professionals respond to disruptions and protect interests and resources by engaging in multiple interdependent modes of boundary work.

Insert figure 1 here

Figure 1 summarizes the empirical specificities of *intertwined boundary work* in accounting and law PSFs in response to AI. These specificities reveal several important insights. They show that *intertwined boundary work* emerges when, firstly, *opportunity ties* develop – i.e., when one mode of boundary work creates an opportunity for another mode that generates additional benefits for the group in question. Our analysis shows that boundary work became intertwined as professionals moved from *defending* to *creating* because of the former opening up the opportunity for the latter. Figure 1 reveals that *intertwined boundary work* can also result from *necessity ties* – i.e., when one mode of boundary work necessitates other modes because of ripple effects that make the success of the first mode contingent on the enactment of other modes. An example is the way that, in our analysis, *defending and creation* boundary work led to a new and pivotal role for technologists, which necessitated *negotiation* boundary work. *Negotiation,* and the *boundary bridging* mechanism that enabled it, was needed to allow the adjusted task division and teamwork that underpins the claims and ways of working associated with *defending and creating*. Likewise, *negotiation* necessitated *coalescing* boundary work, because professionals had to accept reforms to partnership boundaries if the role of the technologist was to be sustained within PSFs.

When *intertwined boundary work* emerges, there is also the potential for a degree of *recursive change reinforcement*, defined here as when one mechanism of change consolidates another. This is illustrated in our analysis by how *creation,* and the associated *defining of new domains* with reference to the new role of AI alongside professional judgement, once enacted, further sustained the *adjusted and restated claims* made as part of *defending* boundary work. Similarly, when technologists became partners as a result of *coalescing* boundary work, they gained greater influence over the organisation of the PSF. This change supported *negotiating* boundary work and claims about the legitimacy of their access to

domains previously reserved for professionals. As such, boundary work responses to disruptive effects, rather than being viewed through a lens that focuses on changes to one boundary or multiple coexisting but independent modes of boundary work, need to be viewed as intertwined, and analysed as a system of changes "that are neither fully constrained nor fully independent" (Abbott, 2005, p. 248).

Discussion

This paper poses the question, *How do interdependencies between modes of boundary work emerge and affect the way professionals protect their interests and resources during periods of disruption?* We show that interdependencies emerge when challenges to professional interests and resources trigger an initial mode of boundary work that necessitates, or creates opportunities to accrue further benefits from, additional modes. These *necessity* and *opportunity ties* result in a creative response to disruption that re-protects interests and resources through the combination of the strengthening (competitive change) and weakening (collaborative and configurational change) of boundaries. Our analysis primarily advances studies of boundaries and boundary work by professionals, with implications for broader questions about AI in PSFs and inter-profession collaboration.

In terms of research on boundaries (Currie et al., 2012; Kellogg et al., 2006; Langley et al., 2019; Raviola and Norback, 2013; Feyereisen and Goodrick, 2019), our analysis moves beyond the hypothesized role for intertwining during periods of boundary work (Langley et al., 2019) by theorizing how interdependencies between modes of boundary work develop. We show that simultaneous and most importantly synergistic raising, realigning, and designing of new boundaries is crucial during periods of significant threat and disruption.

Therefore, research on boundary work in the professions needs to adopt a more holistic approach that focuses not only on multiple modes of boundary work, but also on the relationships between modes. Such an approach matters because, at one level, it extends understanding of the triggers of different modes of boundary work by showing that one mode can trigger another mode. For instance, Langley et al. (2019) note that existing studies assume that creation occurs when new groups seek to protect resources. Our analysis of *intertwined boundary work* shows that creation can also occur when, in conjunction with defending, it allows an existing group to protect themselves through expanded domain reach. Similarly, we show that negotiating and coalescing can be triggered by relationships with defending and creating.

At another level, a holistic analysis allows a different conceptualization of the effects of coexisting modes of boundary work. Studies have previously highlighted the conflicting nature of simultaneous change that strengthens and weakens boundaries (Bos-de-Vos et al., 2019; Glimmerveen et al., 2019; Werner and Cornelissen, 2014; Zietsma and Lawrence, 2010). Our analysis of *intertwined boundary work* shows that such changes can also be complementary when triggered by *opportunity* and *necessity ties* and when they consolidate one another through *recursive change reinforcement*. We, therefore, address a lack of theorization of "how changes on one boundary reverberate elsewhere" (Langley et al., 2019, p. 729) and theorize how competitive, collaborative, and configurational boundary work can be used synergistically to enable creative responses to threats. The understanding of *intertwined boundary work* developed here is further important because such creative responses seem likely to be increasingly pivotal in the future as professionals continue to respond to the evolving effects of AI, and other disruptions such as major regulatory reforms, that threaten interests and resources.

In terms of broader implications for work on PSFs, we extend existing studies of the effects of AI on PSFs that to date have focused of new business models (Armour and Sako, 2020; Spring et al., 2022) and new ways of managing and organising work (Kronblad, 2020). In particular, our analysis provides more precise insights into how professionals work with AI. It has been highlighted that AI poses questions about how the important abilities of professionals to synthesize information and address ambiguity (Abbott, 1988; Freidson, 2001), make context-sensitive and creative decisions (Pettersen, 2018), and reassure and empathize with clients in ways that generate trust and reassurance (Fleming, 2018) can be maintained whilst also exploiting the benefits of AI. Raisch and Krakowski (2021) suggest this creates a paradoxical situation in PSFs of needing to balance automation and the replacement of professional work with the augmentation of professional work through AI. Our analysis reveals that *intertwined boundary work* allows automation to be accommodated in ways that both enable its benefits to be exploited in context sensitive, bespoke, and creative decision making and enable the interests and resources of professionals to be protected. In particular, it shows that in PSFs ways are being found to accommodate AI that minimises paradox and recreates boundary-based distinctions between professional and non-professional work so as to secure the future role of human professionals in augmented professional work.

We also show that *intertwined boundary work* in response to the effects of AI, nonetheless, affects the organization and management of PSFs in previously undocumented ways. Interdependencies between collaborative boundary work (*negotiating*) and configurational boundary work (*coalescing*) lead to changes to divisions of work and power structures in PSFs. In our analysis this relates to how technologists gain access to the partnership and begin to influence control over how professional work is organized. Such changes have important implications because they unsettle partnership structures and

systems of professional control that are widely recognised as fundamental to the governance of PSFs and symbolic of their distinctiveness compared to corporate hierarchies (von Nordenflycht, 2010; Smets et al., 2017). Our study reveals, then, that AI has impacts on the organization of PSFs that are different to those noted in existing studies of AI (Armour and Sako, 2020; Kronblad, 2020) and in studies of other disruptions, such as the pressures associated with managerialism (Powell, Brock and Hinings, 1999; Allan, Faulconbridge and Thomas, 2019) or the need for partnerships with a P3 form focussed on professionalism, partnership and purpose (Smets et al., 2017). This suggests AI will have long-term effects that require further research as part of efforts to understanding the implications for some of the features of PSFs organization.

Our analysis also raises intriguing questions for research on inter-profession and inter-occupation collaboration in PSFs (Adler and Kwon, 2013; Apesoa-Verana, 2013; Comeau-Vallée and Langley, 2019; Currie et al., 2012; Wilhelm et al., 2019). Most previous studies emphasize how collaboration leads to the passing of what is viewed as lower-skilled 'scut work' (Huising, 2015) to other groups. This relates more broadly to the idea that 'non-professionals' take subordinate or brokerage roles (Currie et al., 2012; Kellogg, 2019). Our analysis suggests that *intertwined boundary work* can create different kinds of relationships, with newly emergent professions (in our cases technologists) taking-on strategic tasks that ultimately enable boundary work by incumbent professionals (in our case accountants and lawyers). In our analysis this related to how technologists responsible for AI systems completed initial analysis but also delivered new insights that assisted accountants' and lawyers' *creation* boundary work. Our analysis suggests, then, that as part of growing interest in the ways that different professions and occupations collaborate (Galperin, 2020; Huq et al., 2017; Kellogg, 2022; Truelove and Kellogg, 2022), it is valuable to further theorize the

relationships between boundary work and inter-professional collaboration. We show that relationships with boundary work can result in the heightened strategic importance of collaborators such as technologists, this potentially further driving changes in PSF organization and management as new collaborators become key actors in firms.

It is, however, important to recognise some of the limitations of our analysis that affect its generalizability. Our findings are focused on PSFs and to understand their applicability to wider questions about the effects of AI on management and organizations more generally (Anthony 2021; Curchod, Patriotta, Cohen and Neysen, 2020; Kellogg et al., 2020) requires additional research. Boundaries that protect resources and interests like those found in accounting and law PSFs do not exist in all occupational contexts, and hence the relevance of *intertwined boundary work* in other non-professional contexts is unclear. Indeed, further work is needed to understand whether the insights gained from studying accounting and law apply to all professionals and PSFs. Could, for example, management consultants respond in similar ways or do the specific histories, regulatory contexts and the strength of closure regimes in a profession affect the role of boundary work in response to AI? Similar questions apply to doctors, where existing studies have revealed the 'redistribution of expertise' (Rowe et al., 2021) in response to the introduction of AI into healthcare. *Intertwined boundary work* may apply in this professional context, but this would need to be tested as the specific governance systems in hospitals and healthcare systems (Apesoa-Verana, 2013; Comeau-Vallée and Langley, 2019; Currie et al., 2012; Wilhelm et al., 2019) may alter the role of boundaries and responses of professionals. Overall, then, it is important to test the applicability of this paper's insights into the role of *intertwined boundary work* in response to AI in a range of other professional and organizational contexts.

There are also questions about when intertwined boundary work emerges. For example, it is possible that in some accounting and law firms, different organizational cultures and forms of leadership could result in responses to AI that are purely defensive and do not leverage the benefits of the kind of *intertwined boundary work* described here. Similarly, the type of threat faced might influence whether *intertwined boundary work* is witnessed. *Intertwined boundary work* may be only observed when significant and very threatening disruptions occur, because it is triggered when extensive and robust responses to threats are needed. Would *intertwined boundary work* be observed when there are smaller perturbations that don't threaten professional interests and resources in such severe ways? More specifically in relation to theorizations of boundary work, there are also questions about the specific mechanisms of *intertwined boundary work* outlined in our analysis. For example, do *opportunity ties* always emerge from *defending*, or can they emerge from other modes of boundary work, for example *creation* occurring first and providing opportunities for *defending*? It seems likely that professionals will always seek to *defend* existing boundaries, and hence it may be the case that *intertwined boundary work* predominately develops as a result of initial and instinctive *defending*. But this assumption needs testing. Similarly, it is important to consider whether *opportunity* and *necessity ties* always emerge together as part of *intertwined boundary work*, or whether intertwining can result from just one of the two ties. As such, our analysis provides a first step towards fully theorizing *intertwined boundary work,* with more studies needed to fully understand its wider relevance and all of the interdependencies between different modes of boundary work.

Conclusions

This paper shows that AI poses significant challenges but also opportunities for professionals. The work of professionals is undergoing transformation as it is automated and augmented (Raisch and Krakowski, 2021), but professionals are responding in ways that strategically exploit the transformation as part of efforts to protect interests and resources. The analysis presented here shows that these responses involve *intertwined boundary work* that generates a new settlement that maintains a distinctive role for professionals and their work. The new settlement results from responses to the impacts of AI that recognise that some work, that was previously the preserve of professionals, has moved into the domain of AI and the technologists who deploy it. However, the responses also exploit the opportunities that AI creates to redefine and where possible expand the domain of professionals, this creating new types of professional work that replace those moving into the domain of AI.

The paper's findings are significant because they develop knowledge of *intertwined boundary work* as a response to severe challenges to professional interests and resources. They also provide one of the first in-depth empirical examinations of how accounting and law professionals and PSFs respond to the adoption of AI technologies. The paper shows that the responses of professionals to the impacts of AI produce more complex outcomes than suggested by some narratives which emphasise 'the end of the professions'. Professionals are redefining their roles and work in ways that, at the moment at least, are not leading to mass redundancies. Moreover, PSFs are adapting, both through the redefinition of the services they provide to clients, and through the reorganisation of systems of work and governance to accommodate a different role for professionals, alongside new actors such as technologists that enable the use of AI. The paper shows, then, that AI is indeed having a significant effect on professionals and PSFs, but in ways that can only be understood through careful and empirically grounded analysis that move beyond questions of redundancy and replacement

by AI. The effects of AI will continue to evolve, and as such, this paper highlights the importance of tracking future developments through a focus on how professional work changes, how professionals negotiate, in part direct and strategically respond to this change, the implications for what professionals do and don't do, and in turn how PSFs evolve as organizing entities.

Notes

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Due to ethical and commercial issues, data underpinning this publication cannot be made openly available.

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Table I: Types and modes of boundary work

Types of boundary work (the goal and effects of boundary work)	Competitive	Collaborative	Configurational
Modes of boundary work (ways of performing boundary work)	**Defending** – established groups repairing a boundary that creates a dichotomy between insiders and outsiders	**Negotiating** – enabling collaboration by reforming boundaries	**Arranging** – Outside action to change the effects of boundaries on interactions to facilitate new activity
	Contesting – different groups struggle over a boundary in terms of who is an insider	**Embodying** – using people and their position to establish collaboration across boundaries	**Buffering** – efforts to allow collaboration between groups from different social worlds with incompatible interests
	Creating – new groups creating a new boundary to legitimize their roles and protect their work	**Downplaying** – purposefully ignoring boundaries to achieve collaboration	**Coalescing** – reshaping existing boundaries to allow activities to be brought together in a redefined space

Source: based on Langley et al. (2019)

Table II: AI tools and their impacts in accounting and law

Category of AI tool	Examples of AI tools widely used	Tasks affected	Impacts on professional work – how does analysis change, and what tasks do professional complete?	Impacts on PSFs
Data review/searching	*Law:* Kira Luminace LegalSifter Casetext ThoughtRiver	Discovery phase - documents reviewed by AI tool to identify clauses/issues of relevance	Professionals focus on analysis of material identified by AI review and no-longer complete the initial data collation stage. Junior professionals no-longer required to complete manual review but have a role in providing first interpretation of outputs of AI tools. Professionals have access to wider range of review analysis, augmenting risk/error detection	*Business models:* Firms able to use AI tools to speed up and extend scope of reviews, allowing them to offer new services (e.g. 100% audit) to clients. *Career paths*: Firms need new cohort of technologists, able to design and operate AI tools
	Accounting: Xero Inflo Mindbridge	Auditing samples - developed and reviewed automatically; ultimately allowing 100% review rather than samples		
Pre-signature contract review automation (CRA) - Automating document review and generation	*Law:* LawGeex ContractSifter HotDocs	Contract review and return – automated, generating MS Word outputs with 'redlines' and comments highlighting issues/corrections	Speeds-up routine work, placing emphasis on professional sign-off rather than completion of lower-level document assembly. Professions freed-up to focus on more bespoke and complex contracts, or alternative activities which require more judgement	*Business models:* Offering to clients is both the AI tools to allow efficiency and support from professionals to address more complex matters *Career paths:* Technologists with expertise in AI tools need to be part of the team pitching/delivering to clients, and thus increasingly represented in senior management positions
	Accounting: KPMG Cognitive Contract Management	Contract and invoice issuing & review – automatically identifying and fixing problems in real-time as new contracts or invoices issued via client's procurement systems. Cognitive document analysis deployed to allow output in client defined format.		

E-discovery	*Law and accounting investigations:* Relativity Logikcull Exterro Everlaw Visallo	Searching information in electronic format - allows evidence in criminal or civil cases, including accounting investigations, to be effectively reviewed and datasets generated from review results used to inform actions.	Enabling professionals to complete previously impossible searches - sifting through large volume of electronic data and associated metadata such as time and date stamp and author. Allows discarding of non-relevant data so analysis and interpretation focuses on most important files. Allows the uncovering of valuable electronic evidence otherwise hard to locate, increasing success rates in cases	*Business models:* New service offerings focuses on pre-emptive strategies to reduce risk. *Career paths:* Big data expertise required, with recruitment of parallel cohort of data scientists alongside accountants and lawyers
Prediction and Litigation technology	*Law:* Premonition CaseText Gavelytics	Case diagnostics - using statistics, past results, and predictive analytics, predicted outcomes of cases can be generated, which can then inform decision to accept a case, fee levels and advice for litigator and client.	Predictions and decisions that flow from them enhanced – allowing better judgement calls about whether and how to proceed. Data led decision making results in new criteria for work accepted and charging strategies. Better predictions lead to better outcomes – as they allow lawyers to better plan a strategy that will deliver what is realistic (e.g. relating to compensation level sought in a claim)	*Career paths:* Requires data analysis expertise within the firm to generate predictive insights. Lawyers not the only decision makers – technologists able to generate predictive data also inform decisions.

Source: interviews and review of industry reports and publications

Table III: data sources

Data type	Role of data	Details of data collected Accounting	Details of data collected Law
Scoping interviews	To understand the nature of AI in accounting and law firms, the areas of greatest impact, and firms that exemplified wider cross-professions trends	15 Interviews comprised of: • 13 accountancy firms • 2 accounting tech firms Roles of firm-based individuals: • 4 technologists, operations/innovation officers • 2 directors of IT/technology • 7 Managing partners/ partners	19 interviews comprised of: • 17 law firms • 2 legal tech firms Roles of firm-based individuals: • 14 technologists, operations/innovation officers • 3 Managing partners/ partners
Document review	To triangulate with insights from scoping interviews and, in particular, identify the way professional associations and other bodies document the potential of AI to change professional work	• 587 articles in Accounting Today • 10 reports by professional bodies, consultants and firms	• 271 articles in Legal Week • 8 reports by professional bodies, consultants and firms
Extended in-depth interviews with professionals in firms adopting AI	To collect data about the impacts of AI on professional work, boundaries and the responses to the impacts. Interviews focused on: • The way AI had changed the work of professionals • How professionals responded to change and how this related to changing boundaries and associated claims that justify boundary protections	25 interviews in accountancy firms: Roles of individuals: • 6 technologists, operations/innovation officers • 4 Directors of IT/technology and Operations Managers • 11 Managing partners/ partners/Directors • 4 accountants	26 interviews in law firms. Roles of individuals: • 4 technologists, operations/innovation officers • 3 directors of IT/technology • 7 Managing partners/ partners • 12 lawyers

	- The extent to which new groups were involved in professional work (e.g. AI technologists), the implications for protection of work by boundaries and the claims that supported co-existence with new groups - How client relationships and service offerings had changed and how this changed claims made about the role of professionals and in turn the existence of boundaries to protect their work - How PSFs had changed as a result of new ways of working or client service offerings, who drove change, the claims used to drive change, and how this altered boundaries	

Table IV: latent code structure and exemplary data

Code	Description of code	Exemplary data
Defending	Responses that involve strategies designed to protect existing boundaries	*Descriptions of the boundary defending* "Today, it is widely held that AI enhances and lends valuable context to the work lawyers do instead of replacing it" (Kira, 2020: 3) "So that's what I would think the red line was for AI technology so the conclusions are still being drawn by informed people rather than the technology itself being a tool to help you draw the conclusion" (Accounting firm audit manager) "All the other AI solutions, whether that's in e-discovery, M&A, due diligence or even contract review, we'll review large amounts of data for you and technologists summarise it but it doesn't, they don't provide legal advice. And so once these products have summarised the data you then have to default to the old way of doing things which is put that data in front of a lawyer and get them to provide advice" (Law firm managing partner) "there's an element of the professional judgement call that no machine can ever do" (Law firm partner) *Mechanism - adjusting and restating of claims* "AI frees attorneys to focus on critical issues that demand their attention. It allows attorneys to complete lower-level tasks with greater efficiency so they can shift their focus to more pressing matters…it helps associates/junior attorneys move up the value chain, lending more purpose to their work" (Kira, 2020: 4) "I don't see the AI taking over the expert's role, I would probably imagine that the focus of the expert might change so they might not be performing as much of the testing they once were but the analysis of the results and the conclusion still needs to lie with the expert…So I think it will just free up the experts to do some different work rather than it taking over their role" (Accounting firm audit manager)
Creating	Responses that involve creating new boundaries around areas of work	*Descriptions of creating* "The application of lawtech within the profession, and also in clients' organisations, is likely to change the scope of work the profession undertakes" (Law Society, 2019: 8) "Where I think the real value of AI in legal services is to make us better. So actually lawyers using AI will always be better than lawyers on their own or will always be better than technology on its own" (Partner, law firm) "I think we'll end up being able to add far more value on the consultancy piece. So I think staff just get redeployed into different areas of the work and I think the compliance piece will be devalued and the consultancy piece will be valued at a far higher figure personally" (Partner, accounting firm)

		Mechanism – defining of new domains
		"we can move from being a compliance focused firm to an advisory focus firm. And using that tech to either be more efficient, so that we can get more done, or be more intelligent" (Managing partner, accounting firm)
		" So I don't necessarily see that the adoption of AI is going to erode law firm's business models. I think it will develop them and provide new opportunities for revenue as law firms start selling AI solutions to clients. But I don't see it as a threat to the kind of law firm business model." (Managing partner, law firm)
		"where we will get to is that the lawyer will just be a different type of person" (Law firm technologist).
Negotiating	Responses that involve developing collaborations with other occupations outside of the boundary of the profession	*Descriptions of negotiating* "We certainly have people working in our teams now who are technology specialists first and accountants second" (Chief operating officer, accounting firm) "when there was no project plan and it was just freestyle…Now, clients are saying, 'Let me have a look at the implementation plan for this project.' You need a project manager" (Managing partner, law firm) *Mechanism - boundary bridging* "[We] have different skilled people in the profession. So we might have data scientists that just look at the data and help you run the data analytics software and then they pass it to someone else. So I think you're going to find that we're going to end up into a bit more of a profession that has a lot more niche people with niche skills" (Technologists, law firm) "we've created a whole batch of new roles that didn't exist ... Legal project manager, legal analyst, legal knowledge engineer, legal technologist" (Managing partner, law firm)
Coalescing	Responses that involve existing boundaries being reworked and insider/ outsider definitions changed	*Descriptions of coalescing* "Typically partners would be at the top, probably going down towards, if you're looking in hierarchical terms it's always paralegals at the bottom of the tree. 10 years ago no one battered an eyelid at that but things are moving towards being much flatter structure" (Technologists, law firm) *Mechanism - redefining boundary exclusions* "I think it's a mistake to categorise people by disciplines because the tech team are in some areas probably and the business analysts more important than some of our lawyers. And that is an important shift in professional practices" (Managing partner, law firm) "The legal 'pyramid' that has a handful of senior partners at the top and an army of junior lawyers doing repetitive search and verification work at the bottom will be replaced" (Deloitte, 2017: 4)

Opportunity ties	When one mode of boundary work creates opportunities for another mode	*Defending, and adjusted and restated claims developed about AIs role, enabling creation* "it's the ability of AI and machine learning to augment lawyers and serve up in whatever cunning use case we're talking about, but serve up relevant information more quickly, better analysed to enable us to do the nuanced thinking and judgement that the client wants that's where we're going to feel the impact" (Managing partner, law firm) "on the technology side are the technologists…we as a practice can say well we move our compliance work to automation and AI [completed by technologists] but what we'll do is we'll carve out much more of a business advisory, strategic partner type role [for accountants] (Chief operating officer, accounting firm) "They're being called what they're calling the T-shaped lawyer with the vertical bar of the T being the legal thing which frankly you take as a given. You know, they should have good legal skills but the horizontal bar of the T being additional skills and we would see that as being able to use technology" (Technologist, law firm)
Necessity ties	When one mode of boundary work necessitates a second mode	*Defending and creating, and their reliance on AI deployment by technologists, require negotiating* "I think what we are seeing is an increasing need for non-lawyers to support lawyers because of technology, because you need to be able to have analysts and change managers and business analysts and I think going forward we'll need people with data analytic skills, that kind of thing" (Technologist, law firm) "you'll have lower grade people dealing with the front end, so that might be collecting the data from clients, dealing with the lower grade areas. The information will then be sucked into the technology and then out, and there'll be people that look after the technology and then it will be sucked out the other end to the senior consultants to go and deliver the added value or to interpret what's coming out" (Partner, accounting firm) "what we've been trying to do for the last however many years, two, three years, is use tech as much as we can so that we can move from being a compliance focused firm to an advisory focus firm. And using technologists to either be more efficient, so that we can get more done, or be more intelligent. So rather than somebody sitting there and putting stuff up manually, it's using technologists to do that, or helping us to get to data far more quickly so we can sit with a client and advise them" (Managing partner, accounting firm) "I think you'll find an emergence of new roles, new skills, we find, which is actually, you know, you'll need people that can configure and monitor and project manage systems and tools that didn't even exist five years ago (Chief operating officer, accounting firm) *Negotiating, and recognition of the value of technologists as collaborators, requires coalescing* "I personally think the way the industry's going this whole accountancy partnership model will have to change because at the moment its very much based on your audit partners and tax partners have a portfolio of clients that bring in a level of fees and then you sort of get to a point where you've got enough experience and you can bring in enough money that you make partner. Well that's not going to work anymore" (Technologist, accounting firm)

| | | "We still rather bumble over the word lawyer and or the phrase lawyers and non lawyers and I think that phrase non lawyer is disappearing in our firm where its used in a slightly disparaging way. We recognise lawyers and other professionals who can bring skills to bear for a particular client matter. So our lawyers are recognising it and at the same time the clients are recognising these are valuable skills which they should pay for" (Technologist, law firm) |

Figure 1: intertwined boundary work in accounting and law PSFs in response to the disruption caused by AI

Recursive change reinforcement

Competitive boundary work

AI's disruptive effects

Defending
Repair through adjusting and restating claims

Opportunity tie
Enables

Creating
Strengthening protections by defining new domains

Necessity tie

Requires

Collaborative boundary work

Negotiating
Enabling new protection by boundary bridging

Necessity tie

Requires

Recursive change reinforcement

Configurational boundary work

Coalescing
Blurring boundaries by redefining boundary exclusions