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A culture of digital planning? An international comparison of culture, planning and technology

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ABSTRACT

Urban planning has become an increasingly digital practice in the last three decades and was accelerated by the COVID-19 pandemic. Discussions around the digitization of planning processes have focused on the platforms planners use, and the barriers to their use. Such literature does not adequately explain the variability in the use of planning-specific technologies among planning authorities with the same resources and time. We explore the degree to which workplace and professional culture influence the use of digital technologies in planning practice in Australia, Great Britain, and the United States of America. To study cultural attitudes, a mixture of interview data from 29 planners and document analysis from professional organizations were used. The study found cultural factors play a role in determining the diffusion of technology in planning practice. Our analysis demonstrates points of convergence and divergence across all three geographies of practice, with stark differences in the way that technology is discussed and espoused, as well as a broader lack of clear principles to guide the profession through digital transitions across scales.

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1. Introduction

Planners use digital technologies everyday, with the number and capabilities of technologies constantly increasing and evolving (Daniel and Pettit 2021; Potts 2020). Despite the increasingly pervasive and widespread use of technology by planners, the use of many planning specific technologies and software remains fragmented and varied across different planning systems (Riggs, Steins, and Shukla 2019). There is a large body of literature exploring the applicability, usefulness, and relevance of various technologies to planning practice, as well as the barriers to adopting them in practice (Jiang, Geertman, and Witte 2020; te Brommelstroet 2017; Wilson, Tewdwr-Jones, and Comber 2017). While such discussions have focused on issues such as cost, complexity, skills, and infrastructure required to use such technologies, scholars have consistently called for greater research on the role and impact of culture in planning practice and the adoption of information and communication technologies (ICTs) (Daniel and Pettit 2021; Jackson 2022). As the literature on planning culture suggests (c.f., Friedmann 2005), culture can lead to substantial variations in the institutions, organizations, and practices of planning from place-to-place. This research is centred around the following questions:

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1. What is the culture around digital technologies in planning practice?
2. How does culture around digital technologies in planning practice vary internationally?
3. How does culture impact the use of digital technologies in planning practice?

In this research we explore the above questions by examining reports and other policy documents that articulate the way in which different international planning bodies conceptualize technology and espouse its uses to its members. We also draw on the findings of 29 interviews with practicing planners from Australia, Great Britain, and United States of America (USA) to further understand the cultural attitudes towards digital technologies in planning practice in different countries and explain the differences in technological uptake.

The paper begins in Section 2.0 with an exploration of technology adoption in the urban planning discipline, detailing its evolution and variability of uptake internationally. Section 2.0 also examines the concept of culture, with a particular focus on workplace culture and studies of the culture of planning systems. The research methods of this work are presented in Section 3.0, including the research design, and details of data collection and data analysis. In Section 4.0 data from the document analysis and interviews are outlined, with key trends and themes identified, and a comparison of the findings from the three countries presented. These findings are discussed in detail in Section 5.0, with reflections on how the findings add to existing knowledge and challenge existing understandings of culture around technology in planning practice. Section 6.0 presents the key conclusions from this research and identifies a series of recommendations for planning practice and professional bodies.

1.1. Literature review

Since the 1950s, planning has sought to use state-of-the art technology to make plans. First, planning leveraged mainframe computing and cybernetics in the mid-twentieth century to justify the rationality of comprehensive plans for cities and regions (Goodspeed 2015). Later, desktop computers allowed planners to take this further and provided planners access to new tools for data analysis, forecasting, and plan production (Klosterman and Landis 1988). For example, Geographic Information Systems (GIS) were developed to digitize Ian McHarg's overlay method for ecological landscape planning (McHarg 1969). Desktop computers armed with GIS put this powerful method in the hands of planners around the world. More recently, the emergence of social media, augmented and virtual reality, and more participatory digital software packages and platforms have provided planners with new tools and opportunities to collect and analyse information, and create dialogue between stakeholders (Wilson, Tewdwr-Jones, and Comber 2017).

1.2. Adoption of technology in planning

The planning literature is somewhat divided in its discussion of the adoption of technology in practice. Like most professions, planning has comprehensively adopted generic computing technologies (e.g. e-mail, word processing, etc) for use in most job-related tasks. Some technologies, particularly those linked to e-planning, e.g. web-based mapping software, interactive digital planning documents, institutional websites, et cetera, have been strongly embraced by planning authorities (Riggs, Steins, and Shukla 2019). However, there is also a substantial body of evidence to suggest that the adoption of planning specific technologies, or plan-tech, has been highly fragmented (Vonk, Geertman, and Schot 2005). This is especially true when comparing the adoption of planning technology internationally, as a result of different planning systems emphasizing different skill sets and software packages (Firmstone and Coleman 2015). For example, a study of ICTs used in land use planning in Australia, Italy and Switzerland found planners in Switzerland more likely to use computer-aided design software than those in Italy or Australia (Russo et al. 2018).

In many respects, fragmented adoption is expected. Couclelis (1991), referring to GIS technology, suggested that this fragmentation may be related to the mismatch between the dominant perspective in planning practice and the state of technology available to support planning work. Couclelis described how GIS and spatial data of the late 1980s/ early 1990s did not meet the communication needs of practicing planners. Since then, the challenges faced by planners adopting ICTs have been comprehensively explored, with an emphasis on the relevance and user-friendliness of software, cost of technology, skills of planners, and data availability (Gocmen and Ventura 2010; Tang et al. 2019; Wilson, Tewdwr-Jones, and Comber 2017). However, by linking data and technology to practical habits, Couclelis (1991) offered a rare check on the deployment of technology just prior to the explosion of ICTs concomitant with arrival of the world wide web. Couclelis's (1991) points to a cultural phenomenon in planning practice that connects norms of professional behaviour with the technology available at that point in history. We take Couclelis's observation – that planning practice is a cultural phenomenon and the adoption of technology for practice is as much a function of that culture as it is a function of the global state of technology – as a point of departure for understanding the different ways technology is adopted, place-to-place. Thus, in order to understand technological adoption, we need to also understand how planning culture shapes planning practice.

1.3. Culture

The practices of urban planning are not ubiquitous, and as the professional practice is understood very differently in different places, it can often reflect unique planning cultures. Cultural differences in planning practice has long held the attention of planning scholars. The discussion of planning cultures grew in the 1990s, as scholars increasingly recognized planning as a process that is highly influenced by its cultural context (Sanyal 2005), and thus culture is a critical factor in understanding differences in approaches and outcomes in planning systems internationally (Keller, Koch, and Selle 1996).

In this paper, we follow Friedmann's, admittedly imperfect yet useful, definition of planning culture which he described as the formal and informal ' … ways … that spatial planning in a given multi-national region, country, or city is conceived, institutionalized, and enacted' (Friedmann 2005, 184). Culture is constantly being generated, modified, and reinforced by individuals and collective groups of individuals through shared actions, experiences, habits, and expectations (Ernste 2012). Binder and Boldero (2012) argue that culture is synonymous with the Bourdieusian concept of 'habitus' and that planners reproduce culture because habitus operates at an unconscious level and thus such practices become 'business as usual'. Planning culture is also tied to the historical and political culture of the places in which it is practiced, tying particular habits and experiences of practice more concretely to specific locations (Friedmann 2005), especially as practical habits are shaped by the institutional settings in which they are enacted (Taylor 2013)

As a result, some have argued that comparative studies of planning in different countries often focus on structural systemic differences, but rarely consider the cultural elements of planning systems which include the 'unconscious routines, the unexpressed points of views, traditions, paradigms, cognitive frames, and philosophies that underlie the 'technical knowledge' of spatial planning' (Othengrafen and Reimer 2013, 1270). Therefore, studying culture, directly, in planning systems is important in an increasingly globalized world as it enables greater reflection on the assumptions underpinning planning practices, the purpose of planning, and learning from best practices within other planning systems (de Vries 2015).

Culture defines and regulates the ways in which public-sector planners relate to their roles (Inch 2010). It also determines the limits of the processes by which planning practices can change (Schön 1973). For example, Inch (2010) argues that culture change aimed at improving practices and skills is easier to achieve than cultural change that is focused on changing personal and professional identities. Jackson (2022) recently analysed cultural differences among planning practitioners in three

locations, Glasgow, Scotland; Toronto, Canada, and Melbourne, Australia. Jackson found that differences in the economic fortunes of each city and different bureaucratic cultures led to different planning practices in each location. He notes that habits, built through ongoing practice in a particular planning culture, were hard to change, challenging the progressive aims of planning practice. This reflects Inch's (2010) observation about the challenges of changing identities even while day-to-day practices may be easier to change by comparison. It is also a very similar finding to what Daniel and Pettit (2021) refer to as 'Cultural inertia,' Jackson (2022) refers to as 'path dependence.'

In parallel to these discussions of culture in planning, scholars have also explored the role that neoliberalism has played in transforming planning practice (Sager 2011). For instance, Lord and Tewdwr-Jones (2014) and Allmendinger and Haughton (2013) recounted the evolution of planning practice in England as a result of neoliberal efforts to modernize planning. These efforts were aimed at improving the efficiency by which plans were made and by which land use changes were permitted. However, others have explored the degree to which neoliberalization has affected the values, norms, and habits of planning practice. Inch (2018) sought to merge these two streams by exploring how neoliberal reforms changed the culture of planning in Scotland. Inch notes that, '[m]odernisation therefore generated widespread acceptance of central tenets of a broadly neoliberal conception of market-supportive planning … '(1089).

For our purposes, neoliberalization connects to two components of our research. First, following Inch (2018), neoliberal reforms more peacefully impact planning when it targets both the cultural and structural dimensions of planning practice. Second, planning technology can either function as a handmaiden to neoliberalization by improving planning efficiency and empowering those on the right side of the digital divide, or it can fortify planning against neoliberal reforms by allowing planners to keep pace with the neoliberal powers-that-be. Therefore, whether we are discussing technological innovations or governance reforms aimed at modernization planning, culture continues to be an important variable (Taylor 2013).

As we noted above, technology is a deeply embedded component of planning practices, globally. However, as Daniel and Pettit (2021) noted, adoption of technology by planners in different locations has been uneven. They surveyed planners and hosted focus groups of planners in New South Wales, Australia just prior to the onset of the global Covid-19 pandemic. The goal of their work was to identify how technology is used in the day-to-day practices of professional planners, and they found that actual use lagged the grand vision of technological boosters in planning. While they did not find that this was linked to often cited generational dynamic wherein senior planners resist the adoption of new technologies proposed and championed by their junior colleagues, they highlight the potential role that cultural inertia plays in the use of technology in planning, and that inertia is built and reinforced by bureaucratic demands, on one hand, and by professional attachments to standardized models of the planning process. Despite these studies indicating cultural inertia/path dependency may be a limiting factor in the digitalization of planning systems internationally, little is known about the culture of technology in planning practice. This study seeks to fill that gap.

2. Methods

The purpose of this paper is to characterize the different cultural attitudes about technology in professional planning practice and to conduct an international comparison of those cultural attitudes. To do this, we collected and analysed public documents from three professional planning organizations – the American Planning Association (APA) in the United States of America (USA), the Royal Town Planning Institute (RTPI) in the United Kingdom, and the Planning Institute Australia (PIA) in Australia. We also interviewed 29 professional planners across the three countries, and analysed the interview transcripts to identify the different ways culture may affect the use of planning technology.

2.1. Document analysis

Documents were retrieved from the websites of the three professional organizations between December 2021 and February 2022 and represented the most current documents for each organization at the time they were collected (See Table 1). The review was limited to documents intended to provide practitioners with guidance on planning technology. We assumed that these documents reflected guidance to professional planners on how and when to use technology in their practice. Some documents were global in their assessment of planning technologies, whereas others were specifically targeted at one piece of technology (e.g. the APA PAS Report on Drones). A full list of the documents analysed can be found in Table 2.

Documents were analysed inductively to understand the cultural attitudes towards technology within each professional organization. Each document was read independently by a member of the research team, who made careful notes which described the information and themes, and then concluded by summarizing the themes and information contained within each document. The researcher then drafted a summary of the relevant themes across the entire set of documents for each planning organization. We then compared the documents from the different organizations. We noted differences and similarities in the way that planning technology was viewed in each country and by each organization. We also identified themes that we had anticipated/expected to see included in the documents and that may have been omitted.

Analysis of public documents from the professional organizations in each country led to the identification of ten key themes (listed below) related to the culture of technology within each professional organization. We used these themes as hypothetical points of departure for the analysis of the interviews and expected them to be reflected by the practitioners to whom we spoke.

2.2. Interview analysis

Between August and November 2022, we interviewed 29 professional planners working in Great Britain, Australia, and the USA (see Table 3). While participants across the UK were approached, no participants came forward from Northern Ireland, limiting this study to focusing on planners working in England, Scotland and Wales Research subjects were recruited via snowball sampling. We started with an initial set of contacts (~8-10 individuals), drawing on our connections to practicing planners, and recruiting them to participate in our interviews. We then asked each participant to recommend additional participants based on their professional networks. We repeated this process until we had interviewed about the same number of individuals in each country and the substantive topics discussed during the interviews began to repeat. We therefore expected that interviewing additional individuals in any of the geographic areas included in our study would be unlikely to yield new or different responses. The research used a semi-structured interview approach to enable a greater level of 'dialogue by allowing more leeway for following up on key themes' (Leavy 2014, 437). Interviewees had between one and 30 years of experience and worked in various types of planning. Sixteen identified as male and thirteen identified as female, and represented a number of different geographies within their region of practice (e.g. countries, states,

Table 1. Summary of documents collected from professional organizations.

Professional organization	Number of documents	Publication time-frames	Document types
Planning Institute of Australia	3	2016–2021	Policy submission documents, and a discussion paper
Royal Town Planning Institute	4	2016–2021	Policy papers
American Planning Association	7	1997–2021	Planning Advisory Service Reports

Table 2. List of documents analysed.

Source	Document Name	Author(s)	Year Published
Planning Institute of Australia	Planning Institute of Australia – Submission to Draft Smart Places Customer Charter	Audrey Marsh	2021
Planning Institute of Australia	PIA Submission to Smart Cities Plan	Kirsty Kelly	2016
Planning Institute of Australia	3D City Modelling in Queensland: a Conversation Starter	Huelin Consulting	2016
Royal Town Planning Institute	Planning and Tech: Planning for the growth of the technology and advanced manufacturing sectors	None Listed	2016
Royal Town Planning Institute	The Digital Economy and Town Planning: Planning's role in the growth of the new economy	None Listed	2017
Royal Town Planning Institute	Positive, Proactive Planning for the Future: The RTPI's commentary on the Planning White Paper	None Listed	2020
Royal Town Planning Institute	Planning for a Better Future: RTPI Proposals for Planning Reform in England	None Listed	2021
American Planning Association	Smart Cities: Integrating Technology, Community, and Nature	Petra Hurtado, Benjamin G. Hitchings, and David C. Rouse	2021
American Planning Association	Using Drones in Planning Practice	Ric Stephens, Rob Dannenberg, Wendie Kellington, and Patrick Sherman	2020
American Planning Association	Creating Planning Documents	Allyson Mendenhall, Claire Hempel, Emily Risinger, and Stephanie Grigsby	2017
American Planning Association	Big Data and Planning	Kevin C. Desouza and Kendra L. Smith	2016
American Planning Association	Planning and Broadband: Infrastructure, Policy, and Sustainability	Kathleen McMahon, Ronald L. Thomas, and Charles Kaylor	2012
American Planning Association	E-Government (Revised Edition)	Jennifer Evans-Cowley and Joseph Kitchen	2011
American Planning Association	E-Government	Jennifer Evans-Cowley and Maria Manta Conroy	2004
American Planning Association	Online Resources for Planners	Sanjay Jeer	1999

Table 3. Breakdown of interview subjects by country.

Country	Number	Min/Max Experience	Public/Private Sector	Planning Type	Region of Practice
Great Britain	10	1 - 30 Years	4/6	Development Planning, Infrastructure Planning, Policy Planning, Regeneration Planning	England (6), Wales (3), Scotland (1)
AUS	10	7 - 13 Years	5/5	Development Planning, Infrastructure Planning, Economic Planning	Queensland (6), Victoria (3), New South Wales (1)
USA	9	3 - 15 Years	3/6	Transportation/ transit planning, Comprehensive planning, land use planning, community development planning, Regional environmental planning	Hawaii (2), Illinois (1), Minnesota (3), New York (2), Utah (1)

provinces, etc). The interviews were conducted via Zoom or telephone and lasted between forty and ninety minutes. The interviews were transcribed verbatim and anonymized.

Following the content analysis method of Erlingsson and Brysiewicz (2017), researchers conducted a close reading of each interview transcript and summarized the content. They noted the presence/absence of themes in the interview and documented which themes had been discussed.

Individual interview summaries were then reviewed by both researchers who drafted summaries of the interviews in each country and their most prevalent themes.

Drawing on our analysis of documents from the professional planning organizations, the following ten themes were used to guide the interpretation of the interviews:

1. ***Path Dependence:*** the extent to which initial technology bind planners to particular tools/platforms
2. ***Cultural Inertia:*** how the cultural milieu of a planning organization dictates choices regarding technology
3. ***Competition & Decentralization:*** refers to competition between communities/firms and the extent to which planning practice is devolved to localities
4. ***Mandates & Centralization:*** refers to national/state-level requirements to adopt certain technologies or to concentrate planning activities in higher levels of governing institutions
5. ***Responding to Demand:*** the extent to which choices about technology reflect the demands of community members, residents, or citizens
6. ***Left out/Left Behind:*** refers to the degree to which technological advancement is outpacing the ability of professional planners to jeep up and cope with those advances
7. ***Pragmatic Interview:*** reflects the belief that technology advancement is a foregone conclusion and that planners stand in a position maximize its utility and reduce its negative impacts on society
8. ***Normalization of Plan Tech:*** refers to the idea that technology is a deeply embedded aspect of everyday life and planning practice.
9. ***Urban Efficiency:*** refers to the expectation that technology can be used to maximize the efficiency of urban places
10. ***Planning Efficiency:*** refers to the idea that technology can make planners and the act of plan-making more efficient and cost-effective overall

Our findings highlight how the responses deviate and/or align with these themes. We also note points of alignment and divergence between each county, including the strength of references to the themes outlined here.

3. Findings

3.1. Document analysis findings

Analysis of the documents revealed the ten important themes related to the adoption of plan-tech, outlined above. These themes were not necessarily present in all the documents in each country, and the themes often emerged in qualitatively different ways in each location. The relative importance of these themes in each location might suggest different cultural attitudes regarding technology in each location. In this section, we describe some of those differences.

3.1.1. American planning association (USA)

A systematic review of seven PAS reports relating to technology published by the American Planning Association between the years of 1997 and 2022 highlighted four consistent themes. The most pronounced theme in the PAS reports was the observation that the implementation of planning technology, whether that was an e-governance website, broadband access, or smart technologies, would greatly enhance the competitiveness of the city or community adopting the technology. A second, highly consistent theme in the PAS reports related to how technology would improve the efficiency of planning work and strengthen the rational justifications included in plans. Third, the adoption of plan-tech in the United States was often described as necessary given the level of technological diffusion in American society. The idea is that planners are ideally suited

to leverage technologies in ways that are actually beneficial to urban systems. The fourth and final theme is a direct extension of the third. In this theme, the PAS reports strongly suggest that the spread of ICT is a foregone conclusion and that cities and planners who support the development of ICT infrastructure and the adoption of planning technologies in practice are simply responding to the demands made by residents.

3.1.2. Royal town planning institute (United Kingdom)

In the United Kingdom, an analysis of four policy papers published by the RTPI between 2016 and 2021 revealed an evolving perspective on the relationship between the planning sector and digital technologies. The policy papers articulate a sense of inevitability around technology being increasingly used in the planning sector, and a sense that the planning sector needs to 'catch up' in its use of technology relative to other sectors despite acknowledged challenges. The documents raise questions around the relationship between planning and the United Kingdom's economy's growing reliance on the technology sector as a driver of economic growth. However, the documents also tell a story of a planning system that has significant resource limitations, fragmented access to data, outdated methods of engaging with the public, a nation with an evolving economy, and has been pushed into digitizing rapidly as a result of the Covid-19 pandemic. Technology is argued to be a means of addressing many of the system's identified failings, and improving planning outcomes. There is also a clear acknowledgement across the RTPI's policy papers that challenges remain to reform the planning system, particularly relating to planners' capacity to use different technologies, and addressing the digital divide.

3.1.3. Planning institute of Australia (Australia)

A review of all policy submissions and guidance documents published by the PIA on their website revealed three documents that explicitly mentioned technology between 2016 and 2021. Across all three documents, technology is described as an important tool that can be used to leverage better planning outcomes through improved efficiencies in urban spaces, and planning processes. The planning system is framed as being inefficient, unproductive, and ineffective, and technology is presented as the solution to these issues. Productivity and efficiencies are implied to be limited by fragmented communications infrastructure, investment, and lack of collaboration between planning authorities. Coordination between key stakeholders is thus emphasized by all three documents as a necessary condition for digital technology to improve the efficiency of planning systems. All the documents take a planner-centric position on digital technologies, highlighting the importance of the role and expertize of planners in an increasingly digital context. Two out of the three documents analysed refer the reader to a set of 'Plan-tech Principles' developed by two PIA working groups, which variously encourage a culture of innovation and collaboration, use of open technology, and central role planners must play in the design of digital planning infrastructure.

3.2. Interview analysis findings

3.2.1. USA interviews

American planners appear enthusiastic about technology in planning. However, that enthusiasm is sober and practical. According to the interviewees, plan-tech has been woven into everyday planning work, such that nearly every function is supported by technology. As one of the interviewees put it: '*I think we're not unique at all. I think that given our common workload and what comes up most, you use the tools that are most common to the stuff you know*' (USA, Public Sector, Male, 15 years experience). Thus, for American planners, leveraging technology to make plans is a fairly standard and unquestioned component of professional practice.

Two additional themes stood out in the US context. First, the adoption plan-tech is often linked to finances for both private and public sector planners. Interviewees described very little resistance to the technology itself. Instead, they noted that most technology would be adopted if its cost could

be justified. For public sector planners, that meant aligning technology requests with annual or biennial budgeting cycles:

> '*Budgets are such a public thing and such a scrutinized element that … you try your best before the fiscal year to identify what your expenditures are anticipated to be … so we always play that game and we try to rationalize the cost/benefit … ' (USA, Public Sector, Male, 15 years of experience).*

Private sector planners' use of technology was equally tied to financial priorities. For the consultants we spoke to, the application of plan-tech was almost always tied to a specific project and a specific client's needs:

> '*Where I find constraints is you know, all of these projects were won through a pursuit and proposal process. So the scoping and the budgeting that was laid out … [and] I think there's a lot of flexibility to work within the parameters that were initially agreed upon … but it gets a little tricky when there's a need that goes outside of that scope and that's the cost and time piece' (USA, Private Sector, Male, Less than 5 years of experience).*

The second theme that emerged from the interviews with American planners related to competition, and it was present in a few different ways. First, similar to the documents we reviewed, competition between peer communities was mentioned in the interviews. Both public sector and private sector planners recognized that the use of plan-tech by communities was required in order to keep up with or surpass their peers. The strongest form of competition discussed in the interviews related to the competition between private sector planning firms. All of the private sector planners to whom we spoke noted that adopting specific plan-tech software applications would give them an edge over their competitors in terms of winning contracts with public sector clients:

> ' *… It is competitive business to business. So we are competing with other firms and we want to have that edge. So when we're submitting our proposal, we want to say 'hey, yes, we [are] using this cool new tech. That's why we're a superior company." (USA, Private Sector, Male, 15 years of experience)*

The most surprising form of competition discussed in the interviews was internal competition within private sector firms between consultants. Most of the private sector interviewees discussed how individual consultants could distinguish themselves within the firm and become affiliated with a specific piece of plan-tech:

> '*We also have people competing to do new ventures … we can put up a new venture … people … put up different projects. Then we do, like a pitch time, like a shark tank. You get money too, if you win. So like if your idea gets to a certain point, you win a certain chunk of money … and then there's a committee that decides what the new venture is going to be.' (USA, Private Sector, Female, Less than 5 years of experience)*

Plan-tech is a deeply embedded aspect of planning work in the USA, and nearly all of the US interviewees were positive about its role and the culture of its use in both the private and public sector. Cost and budgeting do not appear to be constraining its use; rather, there was a sense that almost any application could be justified subject to timing or project needs. At its core, the culture of plan-tech in the USA seems to be driven by a strong affinity for competition.

3.2.2. Great Britain interviews

British planners in this study were simultaneously skeptical and excited by technology, leading to a somewhat mixed culture around technology. The majority of British interviewees (90%) were pessimistic about technology in planning practice. For example one planner argued that current resourcing issues in the British planning system meant discussions were more focused on staffing shortages rather than technology even though he argues that adopting more effective technologies could *'free people up to do other things … improve resource efficiencies, and see payoffs in the future' (*GB, Private Sector, Male, 13 years experience).

The culture around technology expressed by British planners was largely one of apathy resulting from path dependencies. While only 40% of British planners argued that the technology that they use in their work is not fit for purpose, the majority of participants (60%) largely described

themselves as using general office based software such as the Microsoft Office suite, and less planning specific software such as GIS. There was a strong sentiment that while the technology does what it should at a basic level, it is not particularly helpful at making '*planners' lives easier*' (GB, Public Sector, Female, 13 years experience). One planner argued the software

> '*does what you expect them to do … but they're awful. They literally do what you want them to do at a basic level, but how often do they work? There are days where if [the software] isn't working, then nobody is working … There are days where you just can't do your job*' (GB, Public Sector, Female, 1 year experience).

Resourcing and more than a decade of Government restrictions on spending, in combination with a shortage of practicing planners were cited as exacerbating factors further limiting planners' engagement with technology.

British planners argued that technological change was difficult because certain ways of doing things had become so ingrained despite their inefficiencies, reflecting a high degree of cultural inertia. One public sector planner suggested that planners in Great Britain have just become accustomed to the technology not being fit for purpose, stating '*it's just accepted. This is what we do … this is just how it's always been done. This is how we do it. This is what we have to use*' (GB, Public Sector, Female, 13 years experience). Reflecting this, the majority of British participants indicated they had developed 'work arounds' for software that wasn't fit for purpose.

The culture around technology in planning as a profession was described as being '*slow to change*' and largely '*stuck in the past*' (GB, Private Sector, Male, 15 years experience). This sentiment was argued to influence planning more generally, with planning seen as generally inefficient and issues around technology were framed as compounding systemic inefficiencies. Furthermore, it was argued that the integration of technology into the planning system in Great Britain in recent decades had largely not improved or changed how planning operates. One planner argued that

> '*if you look at the technology we are using at the moment, it is effectively the digital version of picking up a plan, opening it up, looking at it and then typing out what it says … it if wasn't for the fact that people don't print things anymore and you can't get a paper copy of the plan anymore, we'd still be doing that*' (GB, Private Sector, Male, 13 years experience).

As such 40% of the British participants explicitly stated that they didn't believe further digitalization would improve the experience of the planning system for communities or stakeholders, but would slightly improve the efficiency of the planning system.

3.2.3. Australian interviews

Australian planners in this study presented a mixed response towards technology and planning practice. For all the interviewees, the technology and software currently available in their workplaces were not seen as particularly novel or exciting but were largely framed as tools that are ubiquitously in their work. Despite this, the culture around planning and technology amongst the interviewed practitioners was one of open-ness and adaptability tempered with a pragmatic recognition of the challenges associated with adopting new technologies.

Overwhelmingly Australian planners' argued that technology makes their work life easier and offers positive opportunities for innovation and improvement within the planning system. They highlighted the usefulness of technology in understanding spatial trends, accessing and interpreting data, saving time on key tasks, analysing information, facilitating problem solving, saving money, communicating with each other, and conveying information to communities. Australian planners emphasized that technology was embraced because it makes planning more accurate and increases the amount of time planners can spend doing planning rather than administration. One public sector planner argued that having the right technology has multiple benefits and simultaneously

> '*makes our jobs easier, quicker. It makes our work more accurate in terms of making sure we have up to date information. We can do things more efficiently … we can revert resources away from administrative tasks into actually doing more important tasks. I think it saves money*' (Aus, Public Sector, Male, 13 years experience)

Public sector planners in Australia were more likely to see technology as a means of making the planning process more transparent, and better informing and engaging with communities around planning issues. One participant argued that the increasing prevalence of smart technology in society was pressuring Australian planners and planning authorities to ensure that their digital systems reflected the higher expectations of their '*growing customer base that knows more about technology than your average bear*' (Aus, Public Sector, Male, 9 years experience).

Despite strong positive sentiments towards the possibilities offered by continuing to integrate technology into planning practice, all of the Australian participants expressed frustration that the technology available to them was not effective at delivering the desired outputs. Public sector planners tended to argue that their software is outdated, clunky, and not user-friendly, which was explained as being the result of the software needing to include multiple functionalities beyond planning within a local authority (e.g. dog registration, property taxes, etc.). Private sector planners, on the other hand, were slightly more philosophical and argued that no one piece of software or technology will '*never do everything you need it to do*' (Aus, Private Sector, Male, 11 years experience). One participant argued that this was a result of software rarely being '*designed or built for purpose to suit town planners*' (Aus, Public Sector, Female, 13 years experience), while another participant emphasized the skills of individuals as being more important than the quality of the software.

4. Discussion

The findings show that the reception of plan-tech by practitioners is generally positive, but variations in each country appear to reflect different cultural dispositions towards plan-tech. As we note in our literature review, there are several factors contributing to the patterns we observe. Most notably, the focus on efficiency is highly relevant to ongoing efforts to modernize planning practice, both as a regulatory reform initiative (e.g. neoliberalism) and as a professional ambition to keep up-to-date with technological innovations. Nonetheless, our findings suggest that cultural factors play a role in determining the diffusion of technology in planning practice. Our analysis demonstrates points of convergence and divergence across all three geographies of practice, and add to the ongoing literature studying how technology is developed and adopted in planning practice.

4.1. Planning efficiency

The documents and interview data from all three countries stress the real and potential efficiencies gained through digital planning work. Early PAS reports, for instance, build an argument for adopting e-planning technologies that are based on improving the efficiency of urban service delivery (i.e. commerce) and later documents highlight how planning technologies can make labour intensive tasks like data collection and analysis more seamless and efficient. Documents from the RTPI and PIA mirror these underlying beliefs about planning technology, with a greater emphasis on user experiences of the planning system and planner's daily productivity. The emphasis on efficiencies in all three countries likely reflects the increasing convergence and neoliberalization of western planning systems identified by Stead, de Vries, and Tasan-Kok (2015), and as Inch (2018) has argued, micropolitical cultural change can be associated with neoliberalization efforts. We see no reason to disagree with this conclusion in our data. Plan-tech can make planners more efficient, a hallmark of the neoliberal agenda. This is all in addition to the slowing global economy post Covid-19, and the trickle down impact of neoliberal reforms on national and local government budgets for planning (de Vries 2015; Naseer et al. 2023).

Documents and interviews from both the USA and Australia note the degree to which technology has saturated planning and how much planning work has come to rely upon technology. The interviews and documents in Great Britain also recognized this feature, but British planners were not convinced that purpose-built plan-tech would find much purchase in the British planning

system. Furthermore, planners in Australia reflected an optimistic view that plan-tech adopted by individual planners would completely transform the entire planning system, but that transformation had not yet occurred. Comparatively, that transformation had already occurred in the USA and was unlikely to occur in Great Britain. The alignment in the USA and Australia was directly related to the inherent value in plan-tech for practice. This reiterates the findings of Daniel and Pettit (2021) in their study of Australian planners. Planners in both the US and Australia agreed that technology would make planners more efficient by equipping planners with tools that would streamline various components planning processes. The criticality and reluctance of British planners of digital technologies despite the ubiquity of technology in other parts of their lives suggests that planners may be stuck in a path dependency based on past, familiar practices that have 'served them well in the past' (Jackson 2022, 290). Overall, this may reflect the pervasiveness of neoliberal efforts to modernize planning. In the United States, the process has been relatively more seamless than in either Australia or the UK. This could reflect both the lack of a centralized planning mandate in the United States and differences in cultural attitudes about the role of the individual planner and the development of professional skill, which we discuss in the following section.

4.2. Professional development and professional bodies

Professional bodies were largely considered as inconsequential/irrelevant to planners' experiences and knowledge of technology in the planning sector in all three countries. Instead, planners argued that individual planners should be responsible for keeping themselves up to date with technology relevant to their work, rather than professional bodies, governments or their employers. Interestingly however, Australian planners were much more likely to argue that their employer was responsible in part for ensuring they had the correct skills and knowledge to use technology, while British planners were more likely to argue that the central government should play a role in skills development in the planning sector. In the United States the trend was slightly different. Planners suggested that support was available, but that it was up to individual planners to express interest in new training opportunities and take the initiative to seek out resources and support. Reflecting on responses from several US planners, they seemed to suggest that that kind of individual initiative would almost always be rewarded. Many of the US planners we spoke to were not aware of training opportunities from professional organizations like the American Planning Association. Accessing training and professional development programs was almost always viewed as a self guided journey.

These findings suggest that individual planners have significant autonomy and power to influence the degree to which the profession embraces digital transformation, based on their own level of motivation and capacity to develop technologically relevant skills. This emphasizes the role of the planner particularly in the creation and maintaining of the habits and daily practices described by Jackson (2022) and developing a workplace and disciplinary culture around digital technologies. While professional bodies play a key role in representing professional planners in a range of forums, this research finds that their role in digital transformation of the profession is limited. Arguably this may reflect the lack of power of professional bodies over the types of technologies being adopted in practice. It reiterates Inch's (2010) argument that centralized governments with the power to mandate such adoption are likely to be more influential in developing planning culture and practices. Furthermore, as we note above, these dynamics may also be tied to efforts to modernize planning by shifting the micropolitical culture of planning practice. For instance, as we describe in the next section, adoption of technology continues to rely on specific individuals who act as boosters for its use in practice.

4.3. Digital champions and leadership

The role of leaders or specific individuals in a workplace acting as a 'champion' for technology was reiterated across the interviews in the three countries as important in developing a positive culture

around technology. This further bolsters the findings above that specific individuals can have a significant influence on the culture, particularly where those individuals can facilitate social learning amongst their colleagues. Australian planners argued that historic and ongoing leadership played a critical role around the degree to which technology was adopted and integrated effectively. In organizations where leaders/senior decision-makers were open/adaptive in their perspectives around technology and had a good understanding of the tasks done by planners day to day, Australian interviewees argued that the technology available to them seemed to generally be appropriate for their tasks, and is updated frequently. British planners on the other hand, argued that where companies or individuals had demonstrated the applicability of technology in their workplace, technology tended to be seen as more useful, and they were more likely to have a positive culture of adoption because it was clear what the technology would add to the workplace. Having a champion who worked in the planning team and could provide peer to peer learning and provide support using software was also cited as decreasing frustration around technology. Digital champions are thus a critical feature in reshaping and adjusting the 'cognitive frames' and 'routines' (Othengrafen and Reimer 2013, 1270). Digital champions are able to reinforce the relevance and usefulness of job-specific plan-tech to their colleagues by demonstrating it in their daily practices, and providing real-time support in the workplace. Repeated and ongoing exposure to a digital champion in this way likely over time shapes not just the day to day practices of planners, but also their professional identity, overcoming the challenges around broad professional cultural change identified by Inch (2010).

The situation was slightly different in the United States. Convincing decision makers/leaders to adopt new planning technology did not require vocal support or a pre-existing culture that was supportive of technology. Instead, in the US the considerations were entirely financial. For public sector planners, consideration of technology was aligned with budgetary cycles and constraints. According to those planners, adoption of planning technology was most likely to occur when it could be incorporated into municipal budgets and was unlikely to occur outside of the regular budgeting cycles. Private sector planners, on the other hand, linked technology adoption to client needs. Firms adopted technology for specific projects and then internalized that capacity in order to offer to future clients and projects. This suggests that financial opportunism drives most of the adoption of technology among planners in the US. This trend may be tied to the heavier reliance on private sector consultants to replace public sector municipal planners (Loh and Norton 2013), and/or the hyper specialization of professional planning practice in the United States. For example, Barry and Legacy (2023) wrote about the effect this trend is having with respect to participatory planning in which planners are adapting their practices to specialize only on participation. Here, we observe the same tendencies among American planners with respect to technology but include the observation that specialization is linked to personal and organizational returns on investment.

5. Conclusions

The growing prevalence of technology in society and planning systems has led to numerous questions around why, how, and when planners adopt different types of technologies into their practices. Many of these investigations have considered different factors that play into this dynamic, focusing primarily on features of the technology and its ability to deliver improvements to planning practice. Recent discussions in the literature have alluded to the potential role of cultural inertia as a challenge in planners adopting technology; however, the exact nature of how culture impacts the use of planning technology has not been clear. Given the research on the ways that local cultures can change planning practices, we started out by considering that culture should also be expected to have an effect on which planning technologies were adopted by planners and how.

Our findings suggest that culture is indeed an important factor in the adoption and diffusion of planning technology. Culture, in the ways that it creates normative motivations for how planners conduct their business, appears to be a factor in how and when planners adopt technology in practice. Similarities in culture between the three countries were evident, particularly in discussions of

the benefits of planning systems adopting technology, and an emphasis on the need for planners to adapt to an increasingly technological society.

This paper's analysis reveals that there are differences, whereby the APA stands in stark contrast to the RTP and PIA in the way that technology is discussed and espoused, as well as a lack of clear principles to guide the profession through digital transitions across scales. This difference is also reflected in interviews with professional planners in all three locations. The individual experiences of planners mirror the differences revealed by our analysis of the documents from the professional associations, and based on our assessment it appears that practice is driving much of that dynamic. For example, planners, especially in the US, adopt technology to improve their efficiency and/or to make them or their employer more competitive, and the professional organizations respond by documenting innovations developed through practice.

One driver of the differences between the three locations we studied appears to be connected to the structural changes in the planning profession in the United States that has led to different norms and behaviours of practice. Planning has become decoupled from the state-driven political culture in the United States in ways that have not occurred in Australia and Great Britain to the same extent. Furthermore, the strong central planning system of Great Britain may act as more of a structural barrier inhibiting the culture, and the adoption of technology as a result, more so than in the US where the atomization of the profession into a highly individualized practice is driving some of what we observe. Thus, the choice to adopt planning technology appears to be mirroring the same evolutionary trajectories as neoliberal reform movements, with our findings picking up the same variegated nature of those decades-long reforms (Allmendinger and Haughton 2013; Peck and Theodore 2007)

Our research highlights a need for greater research in how professional bodies' position on technology influences planners working within those systems, and the degree to which these planning systems differ in their adoption of technology in practice. It also suggests pathways for both improving or slowing the rate at which planners adopt technology.

Disclosure statement

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