

Delivering Smart Heritage to Local Governments

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Abstract: The governance of future built environments requires novel interdisciplinary discourses to address the complex needs within cities. Smart Heritage, the novel convergence of smart city and heritage disciplines, is one such interdisciplinary discourse that local governments can leverage for unique perspectives and capabilities. To deliver interdisciplinary discourses like Smart Heritage, it is the task for local governments to orchestrate the knowledge, processes, and initiatives between the two contributing disciplines and apply them to their local context and needs. However, as a novel discourse, no academic research is present on how smart city and heritage disciplines converge to deliver Smart Heritage within local government. This paper reports on the interdisciplinary knowledge, processes, and initiatives between the smart city and heritage disciplines in local government. The research conducted interviews with smart city and heritage advisors from three local governments in Australia and draws key findings on these themes. The findings from an academic understanding of how local governments engage with the Smart Heritage discourse.

Keywords: Smart heritage; smart city; heritage; government.

1. Introduction

Local governments require novel interdisciplinary discourses to address the complex needs within cities. Smart Heritage, the novel convergence of smart city and heritage disciplines, is one such interdisciplinary discourse that local governments can leverage for unique perspectives and capabilities to address these needs. Early investigations into local government smart city and strategic heritage documents reveal a theoretical foundation for Smart Heritage that aids the success of future cities (Batchelor and Schnabel, 2019). This foundation reflects the broader expansion of the smart city discipline into non-technological fields where it intersects with cultural and social matters. These expansions witness the adaption of knowledge, processes, and initiatives between the disciplines and the resulting germination of independent discourses. It is the task for local governments to orchestrate the knowledge, processes, and initiatives between the contributing disciplines and apply them to their local context and needs. However, no academic research is present on how smart city and heritage disciplines currently converge to deliver Smart Heritage within local government.

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The paper reports on the interdisciplinary knowledge, processes, and initiatives between the smart city and heritage disciplines in local government. The research conducted interviews with smart city and heritage advisors from three local governments in Australia and draws key findings on interdisciplinary knowledge, processes, and initiatives. The findings shape an academic understanding of how local governments form and engage with the Smart Heritage discourse.

2. Interdisciplinary Knowledge, Processes, and Initiatives

The academic literature reports it is beneficial for organisations, like local governments, to converge knowledge, processes, and initiatives of various disciplines to enable innovation and economic advantages. However, the literature also discusses difficulties occur when disciplines meet. This section provides a brief overview of the research on interdisciplinary knowledge, processes, and initiatives, including their benefits and drawbacks.

Within an organisation, knowledge is an asset comprising expertise with varying qualities and geographies (Izunwanne, 2017). Its presence justifies, and its absence condenses realities around what is known. It exists in many forms, from formalised policies, practices, and scientifically proven results, to informal observations, assumptions, and traditions. Leeuw et al. (1994) argue that interdisciplinary knowledge discourages information silos within organisations as teams do not become protective of specific expertise. Instead, knowledge becomes a domain for all workers to utilities commonly. Therefore, Leeuw et al. recommend that organisations should be critical of overreliance on specialists and continually seek new convergences.

Moreover, Nonaka and Tekuchi (1995) note that convergences can introduce knowledge to an organisation through constructive disruption, as the novelty challenges preconceptions and demand new considerations. However, Lattuca (2001) warns that these processes require additional time to integrate knowledge bases successfully and that it may not be efficient or suitable for all organisations. Researchers also note that technical terminology and philosophical perspectives between disciplines often create conflicts that can slow innovation and productivity (Gooch, 2005; Oberg, 2009; Repko, 2012).

Processes, also known as knowledge management, within an organisation are frameworks that manage knowledge (Gilson et al., 2009). They construct a mechanism which delivers a systematic method to enhance effectiveness and efficiencies. Chang and Lin (2015) state that interdisciplinary processes based on creative collaboration increase the capability for innovation as it enables a broader range of potential outcomes, resulting in an innovative competitive advantage. Kim (2015) claims that interdisciplinary processes are the fundamental building block to collective cohesion and functionality; therefore, they should be a priority for organisational management. However, Vince and Saleem (2004) warn that if the new interdisciplinary processes conflict with the existing operations, this can cause unintentional disruption within an organisation. Organisations should be aware of their social and political contexts before implementing new processes to avoid conflicting with existing processes.

Initiatives are the deliberate applications of knowledge and processes within an organisation. They result in physical or strategic outcomes and external outputs. Helga (2017) discuss how interdisciplinary initiatives produce novel, innovative and holistic outputs, tailor-made to solve complex issues. Lanterman and Blithe (2019) claim the inputs from various disciplines balance the sensitivities in these complex issues which a single discipline may not delicately manage. However, Helga and others warn that interdisciplinary initiatives can also be ineffective in resolving issues in contrast with single discipline initiatives, due to the collaborative processes misdirecting efforts and broader considerations

muddling the project focus (Heemskerck et al., 2003; Stokols et al., 2008; Thompson, 2009; Callard and Fitzgerald, 2015). Therefore, organisations should critically examine the suitability of interdisciplinary convergences within the time, scope, and budget demands of each initiative. Further researchers tell of collaborations diluting the effectiveness of initiatives as the disciplines demand concessions of the aspirations of each other rather than bold solutions (Goldman et al., 2015).

The above brief literature overview identifies interdisciplinary knowledge, processes, and initiatives can deliver innovative solutions within local government, but also introduce new demands and constraints. For the successful delivery of Smart Heritage, local governments must converge smart city and heritage disciplines in contexts that avoid or include mitigation to these unwanted outcomes.

3. Methods

The research undertook interviews with three local governments in Australia. The local governments were Broken Hill City Council, the City of Newcastle, and the City of Melbourne. These organisations provide diversity in size and context; an outback township, a second-tier city, and a metropolitan state capital respectively. In each local government, the research separately interviewed an employee who worked in the smart city discipline and one who worked in the heritage discipline. The advisors were invited to participate in the research by email and later by online video calling. The interviews were approximately one hour in length and were audio-recorded then transcribed.

The interviews were semi-structured in format, containing open-ended questions that followed the themes of knowledge, processes, and initiatives. The first theme, knowledge, sought to understand the knowledge each participant had of the other discipline within their local council. The second theme, processes, explored the processes within the organisation if the advisors were to collaborate, including barriers to convergence. The third theme, initiatives, investigated the current initiatives converging the smart city and heritage disciplines within the local government, including their similarities and differences. The themes offer valuable insights into the realities of the operational environment where smart city and heritage disciplines converge.

Guided by the themes, the analysis involved reading the transcripts to identify valuable narratives across the organisations. Re-listening to audio-recordings confirmed the tonality and contextual interpretations within the responses. These narratives formed the findings in the following section.

4. Summary of findings

The interviews emerged several findings on the themes of knowledge, processes, and initiatives. The below sections report the findings in more detail.

4.1. Key finding: lack of cross-disciplinary knowledge

The Heritage Advisors reported little knowledge about smart cities. They were broadly aware of its existence, however, admitted limited detailed knowledge as a result of few interactions within the organisation or little personal interest.

Concerning smart cities, the Heritage Advisors primarily spoke about technological devices. For example, sensors, tracking of data, pedestrian counters, 5G mobile network, smart lighting poles, virtual and augmented reality, and QR codes. When enquired about specific outcomes of the smart cities disciplines; such as sustainability, economic enhancement, governance, mobility; the Heritage Advisors

assumed there would be broader benefits, but these were beyond their understanding. Some advisors had not considered in detail the other discipline before. Regardless, they were all supportive of any positive outcomes for their city from all disciplines. As an exception, the Heritage Advisor from the City of Newcastle had moderate knowledge of smart cities as a result of previously being within the same council team and mentioned how the smart city team is well-known within the organisation.

"Well, actually not an awful lot, which is quite interesting. I mean, I actually went and looked it up after you contacted me just to make sure I understood what it was about...There is [a lack of knowledge] for me because I am actually not interested in it per se. I like what it does. And I like seeing it happen, but I have no personal interest in it." (Broken Hill City Council, 2020a, Interview with Heritage Advisor, 22 May).

"It helps that [the Smart City] team was originally on the same floor as me in council, so I saw them on a daily basis." (City of Newcastle, 2020a, Interview with Heritage Advisor, 23 June).

The Smart City Advisors had some knowledge about heritage, but this knowledge was assumed or indirectly gained through haphazard interactions and informal learnings. The advisors were aware they did not comprehensively understand the nuances of the heritage discipline and what the heritage team did within their organisation. Their knowledge was primarily through topical issues regarding local or state government historic protection overlays restricting development or advertised heritage exhibitions. A notable exception was the Smart City Advisor in Broken Hill City Council who gave a thorough explanation of the heritage strategy in the council and the decision-making and regulatory processes, including the categories of heritage protection in the city. This in-depth explanation was because the advisor was also responsible for operational matters within the small local government. When asked to consider the outcomes of heritage, the Smart City Advisors described the preservation of historic buildings, as well as interpretation and governance of cultural narratives within the city. There was an understanding that these outcomes are valuable as they represent and engrain cultural identities within the city, and function as civic assets for economic, tourism, and symbolic governance purposes.

"Interestingly enough, if you talk to our planning department, it would be about conservation. If you talk to someone like me who works in economic development, it's also about how we showcase those heritage buildings... I think it's sort of a multi-layered question because depending on what aspect you're coming from, is about how you would view and use that strategy." (Broken Hill City Council, 2020b, Interview with Smart City Advisor, 22 May).

Smart City and Heritage Advisors in the local governments, all saw their role as strategically aligning with the other discipline. However, these alignments were unplanned as they primarily derived from opportunistic or serendipitous conversations or interactions. Therefore, the advisors did not consider the disciplines shared intentional alignment.

In the City of Melbourne, the Smart City Advisor described the utilisation of heritage protection overlays to manage 5g telecommunication infrastructure locations in the city. Historic protection overlays were one of the few controls the advisor had for this purpose due to federal legislation permitting installation. The Smart City Advisor expressed concern over the infrastructure cluttering footpaths while the heritage team sought to avoid adverse installations in historic areas. The Smart City Advisor found strategic alignment with the heritage team through a passing interaction. Similarly, in Broken Hill City Council, the Smart City Advisor and the Heritage Advisor opportunistically bolstered

local and state government grant applications by linking different smart city and heritage initiatives in the tenders. Both advisors in the City of Newcastle reported alignment where the disciplines delivered placemaking outcomes. However, the council did not direct this novel alignment. Instead, it occurred as a result of heritage directives geographically overlapping with smart technology upgrades in the city.

"In order to pull a project together in a council of this size, we need to have a multidisciplinary contribution, because otherwise it's not going to happen and we're not going to get all the information required." (Broken Hill City Council, 2020b, Interview with Smart City Advisor, 22 May).

"Aligns with and delivers, I would say...Smart city aligns in the sense that we are trying to create a future city that acknowledges and honours its past." (City of Newcastle, 2020b, Interview with Smart City Advisor, 30 June).

The serendipitous and opportunistic nature of the alignment often required additional and unforeseen effort to realise benefits. Some respondents expressed frustration with delays from further consultation or new technical requirements introduced by the other discipline. However, all respondents were thankful for the convergences as they created an innovative outcome eventually. Additionally, the unplanned nature of these alignments restricted the convergence to the issue at hand. Therefore, the advisors typically did not consider other opportunities for convergence outside the specific collaboration or instance. However, in the interviews, the advisors were willing to understand how the disciplines can work together better in the future and potentially converge outcomes.

"I'm interested in being strategic... So, I think I've created a job that's probably more aligned with Smart City than would normally be the case." (Broken Hill City Council, 2020a, Interview with Heritage Advisor, 22 May).

4.2 Key finding: reliance on personal connections for convergence

The participants relied on personal connections within the organisation to converge the disciplines. The Smart City Advisor for the City of Melbourne was not aware of a specific process for converging the disciplines in the organisation. The advisor instead relied on their personal network within the council. The Heritage Advisor was also not aware of formal processes and mused that the team leaders would discuss the opportunities before convergence occurred. The advisor said personal connections typically expedited convergences within the organisation and were critical to fill the gaps where formal processes did not exist. However, the Heritage Advisor noted a formal process of endorsement from management and councillors would be required to officially connect the disciplines, secure funding, and utilise other staff resources outside of personal connections. This formal process would take a significant period, and its success would be uncertain.

The advisors from Broken Hill City Council also regularly relied on personal networks. The Heritage Advisor reported that unplanned conversations regularly led to their involvement in initiatives that require heritage expertise. The Smart City Advisor highlighted the small size of the council encouraged an informal process for communication and collaboration between disciplines. The advisor stated there are no formal barriers to convergence between the disciplines other than time and financial restrictions.

The Smart City Advisor and Heritage Advisor in the City of Newcastle leveraged their close working relationship to converge the disciplines. Both advisors previously had contacted each other on the impulse that the other could benefit their initiatives and were not explicitly directed by management to

do so. They both preferred a personal approach due to their familiarity with each other from previously working within the same team. The Smart City Advisor acknowledged that the smart city team had a process for interdisciplinary engagement due to their agile work-method. However, this method was an experiment within their team and not implemented across the organisation.

"The City of Melbourne is a really big local government, and there is a lot of coordination that is required, but there's still a lot of relationship-based activity. So, it's based on your relationships. So even if there was a process, people don't necessarily do that." (City of Melbourne, 2020b, Interview with Smart City Advisor, 4 June).

"Stuff filters through because someone will say, "did you know that we're doing that?" And you go, "no, I didn't", so you make a phone call, and you're in." (Broken Hill City Council, 2020a, Interview with Heritage Advisor, 22 May).

"For me to hatch a project with [the Heritage Advisor], I go downstairs, and I walk up to his desk, and I say 'Hey, can I have a chat?' and we go for a coffee and we hatch a project together. Then if we either like it enough, we crafted through the existing processes." (City of Newcastle, 2020b, Interview with Smart City Advisor, 30 June).

The reliance on personal networks limited the ability for some participants to form new convergences and innovations, such as those convergences that require broad networks or significant organisational resources. Also, there was a lack of procedural support for new convergences in the organisation and, therefore, steep learning curves where new interactions occurred. Some advisors indicated a preference for a more formal and structured approach as another procedural option to personal networks.

The Smart City Advisor at Broken Hill City Council experienced new learnings when installing smart lighting and CCTV monitoring systems into a heritage-listed park. According to the Heritage Advisor (2020), the design of the new technologies did not support the historic aesthetic or values of the park and the advisor "took the council to task" to redesign their installation (Broken Hill City Council, 2020a). The advisors then worked together to integrate the technologies sympathetically. This created time delays, however, formed greater procedural convergence between the disciplines. It led to a successful federal joint-grant application to develop the National Heritage Values Planning Framework for Broken Hill; guidelines and protocols to better manage and enhance historic sites. The Smart City Advisor of the City of Melbourne described how the smart city process is additive, and the outcomes are unclear even to those implementing them. The smart city team accepted this approach; however, it often was unsuitable for other disciplines, like the heritage team, who had deadlines and fixed deliverables. The Heritage Advisor for the City of Newcastle reported they relied heavily on the Smart City Advisor to assist with technology, and the Heritage Advisor appreciated discovering new opportunities to deliver heritage outcomes through technology.

"We're finding out what we don't know, and we don't know what we don't know. So, once we find out something, we'll be able to tell you what the benefits are. But until that point, we are unsure." (City of Melbourne, 2020b, Interview with Smart City Advisor, 4 June).

4.3 Key finding: current convergences

All the participants reported a handful of existing convergences with the other discipline. Most convergences were on placemaking, knowledge transmission, and community initiatives. However, the

convergences saw limited innovation as the scope of the interactions prescribed the inputs; whereas the convergence could not influence the strategic direction of the initiative. All advisors noted that more convergences are desirable.

The Heritage Advisor from Melbourne City Council collaborated with the smart city team on an ongoing three-year 'heritage data project'. The initiative collates the currently dispersed information about heritage places; location, historical photographs, heritage investigations and reports, and current historic protections; into a central digital system to support development application decisions, strategic decision making, and broader placemaking and community projects. As of June 2020, the initiative ended its first year. The second-year builds a digital system to accommodate and manage the heritage data. Also, the Heritage Advisor and Smart City Advisor from Melbourne City Council separately discussed a 'Melbourne City DNA' exhibition for Melbourne Knowledge Week, an annual innovation festival. The exhibition implemented virtual and augmented reality, a series of interactive screens showcasing data, and a 3D printed model of the city to engage audiences with strategic planning issues, including heritage and smart cities. Both advisors highlighted how it conveyed Aboriginal Heritage to new audiences and integrated non-tangible heritage into a planning context through technology. Both advisors could not identify another instance of convergence.

Regarding the limitations to convergences in the City of Melbourne, both advisors noted high workloads in their traditional duties and stated these limited the time for free-form collaborative efforts. Convergences on the Melbourne City DNA initiative was limited to only displaying existing and static smart city and heritage datasets and did not aim to produce new or unknown outcomes for either discipline. Both advisors supported more convergence but were not aware of future opportunities. The lack of known future convergences made it evident that additional resources would be required to pull the disciplines together.

"Yeah, because it's very conditions-based. If there's no permission to be accessed then I don't involve them, or like if there's no benefit for the heritage team then I wouldn't involve them." (City of Melbourne, 2020b, Interview with Smart City Advisor, 4 June).

The Smart City and Heritage Advisors for Broken Hill City Council discussed the ongoing delivery of an inner-city cultural precinct to create a more liveable city, with a measure of people spending more time in the inner-city. The advisors identified the new large-format shopping precincts on the outskirts of the city and the lack of attractive central public amenities detracting from inner-city use. The cultural precinct features an art gallery, a museum and civic archives, and a public library. The Heritage Advisor in Broken Hill City Council worked 'peripherally' on the initiative through assessing the effects on heritage in development applications. The Heritage Advisor was aware that smart technology is involved, but the advisor was not involved in these matters. In the precinct, the Smart City Advisor managed the installation of automatic watering systems, public Wi-Fi, and smart lighting systems. The smart technologies primarily sought operational efficiencies for the cultural precinct and were not explicitly intended to interact with heritage values.

The respondents in Broken Hill City Council had a pragmatic perspective of the limitations of convergence. The Heritage Advisor acknowledged the immediate need to address the population decline within the city and the restrictions of the small local government budget. Therefore, the advisor prioritised cost-efficient and immediately effective initiatives. The advisor was willing to prioritise these initiatives in place of those serving unknown outcomes from innovative approaches. The Smart City Advisor, who was also responsible for economic development in the council, similarly prioritised the

immediate need to pull shoppers away from large format retail developments on the outskirts of the city. Once these improved central public spaces exist, both advisors supported delivering innovative solutions through the smart city and heritage convergence.

"It's about economic uplift, and about getting more people to spend more time in the central business district because, for the size of this town, we've got a couple of other little shopping precincts that have drawn people out of that CBD space.... it's also about liveability." (Broken Hill City Council, 2020b, Interview with Smart City Advisor, 22 May).

The Heritage and Smart City Advisors from the City of Newcastle reported multiple convergences. Their primary convergence regarded placemaking and knowledge transmission surrounding historical narratives. Both advisors discussed placemaking initiatives in public spaces, where they worked on alongside a Guraki facilitator (an Aboriginal advisor) and a placemaking advisor. In these initiatives, the Heritage Advisor identified heritage narratives alongside the Guraki facilitator that the Smart City Advisor integrated into digital interpretative experiences. The Heritage Advisor also previously worked with the smart city team on development assessment applications for digital signage in the historic town centre and supported historical research services to the Smart City team for a mobile application coastal walking tour. The Smart City Advisor described a 'dual naming project' that educated communities about English and Aboriginal names places and dual-cultural perspectives of place. The advisors worked alongside the Guraki facilitator to deliver digital and augmented heritages Aboriginal experiences at these sites. In these experiences, users press a button on signposts to listen to the Aboriginal names and then use their cell phones for an augmented cultural experience of the place and more historical information via a QR code. The Smart City Advisor proffered technical services for the augmented reality experience, while the Heritage Advisor supported research into the historical information. The Smart City Advisor also worked alongside the heritage team to deliver a digital twin of the city for the planning team in the council to engage the public on urban densification matters; the Heritage Advisor advised where heritage protection overlays are present in the city.

The City of Newcastle advisors did not consider the scope of initiatives limited innovative outcomes. The trusted working relationship between the advisors facilitated an environment for free-form convergences. Supporting this view, the Heritage Advisor discussed a quarterly meeting that featured heritage and smart city staff who discussed upcoming opportunities, strategic direction, and processes for collaboration.

"It just so happens that [the Heritage Advisor] is a good person and likes to think in a way that is in the spirit of how the smart city team and I want to operate; which is highly collaborative, future-focused, and get it done. We've got principles, and they seem to suit, but there's no ledger where we help them out, and they go, 'I own one'. It's project-by-project." (City of Newcastle, 2020b, Interview with Smart City Advisor, 30 June).

4. Conclusion

The research demonstrates that local governments tenuously orchestrate the Smart Heritage discourse through a patchwork of knowledge, personal networks, and a handful of convergences. Regarding knowledge, most of the Smart City and Heritage Advisors responded they have little or limited knowledge about the other discipline. Generally, they described the other disciplines based on tangible user-experiences, such as virtual reality and heritage development restrictions. Drawing on the above literature about knowledge, this indicates detrimental silos of the disciplines within the organisations

(Leeuw et al., 1994). Nevertheless, the advisors reported that the disciplines strategically align as they both support council-wide aspirations to enhance the city. However, this alignment was unplanned as it derived mainly from opportunistic or serendipitous interactions. Guided by the academic literature, the novelty of these interactions present opportunities for innovation, however, the organisations require additional time and resources to meaningfully integrate the knowledge at a significant scale (Nonaka and Tekuchi, 1995; Lattuca, 2001).

Additionally, the advisors relied on personal connections within the organisations to undertake the process of convergence. There were no formal processes in the local governments for discussing, managing, or implementing convergence between the disciplines; therefore, the advisors relied on their personal network and agency. The advisors generally accepted this approach as they tailored the response for their current initiative. However, some respondents felt limited by the reliance on personal networks to achieve new outcomes that require broad networks or more significant organisational resources. Interestingly, all advisors were not actively restricted by the organisational structure or other internal processes from converging with the other discipline; instead, it was a matter of an absence of processes. These findings are in line with the academic literature on processes, as the tailoring of processes avoids conflict within the organisation from the innovation but restricts the exposure to organisation-wide resources and opportunities (Vince and Saleem 2004).

All participants reported initiatives where the disciplines converged. In most cases, these convergences occurred solely in technical contexts, where their expertise was requested to resolve a specific issue on a programmed outcome; and not deliver innovation or meaningfully influence an initiative outside of this scope. This trend echoed the drawback within the academic literature, where interdisciplinary initiatives can be ineffective in their potential innovation if not comprehensively embraced (Goldman et al., 2015). Only in the City of Newcastle, did the scope for convergence produce novel Smart Heritage outcomes that balanced sensitivities of issues as described by Lanterman and Blithe (2019).

Overall, the convergences share the challenges that are common throughout academic literature on interdisciplinary discourses. Enhancements to interdisciplinary knowledge, processes, and initiatives would improve convergence resulting in more substantial Smart Heritage outcomes. Further research into these improvements, specifically how to construct notable Smart Heritage discourse within local government strategy and operations, would proffer valuable insights.

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