This article discusses potential applications of Geographic Information Technologies in cultural research — amidst concern that confusion surrounds what these technologies are, and how they might be used. We discuss the adoption of Geographic Information Technologies in our own cultural research projects, motivated by empirical shortcomings with existing creative industries and cultural planning research methods, coupled with a desire to more fully explore the geography of cultural life within Australian cities. Geographic Information Technologies can comprise a range of technologies (proprietary GIS software systems, GPS, web mapping) that seek to accumulate geographical information for analysis within computer database systems. In our projects, Geographic Information Technologies enabled spatially sensitive questions about creative activity, affective links to city environments and cultural vitality (asked in interviews and focus groups) to be linked to central map databases. “Collisions of epistemologies” (Brown & Knopp, 2008) were made possible, dissolving boundaries between qualitative and quantitative methods, and connecting our philosophical commitment to everyday, vernacular forms of culture to matters of cultural planning. Results showed a refreshing amount of creative activity occurring beyond visible “hubs”, in suburbs and the vernacular spaces of everyday life. Moreover, cultural life — and creative activities more specifically — was layered, localized and multifaceted within cities, in ways that preclude singular generalizations. Geographic Information Technologies and maps — with their capacities to capture complexity and layered phenomena — helped communicate such findings in digestible formats, to a range of community and government audiences.

**Keywords:** Geographic Information Technologies; Geographic Information Systems (GIS); Global Positioning System (GPS); Geoweb; cultural mapping; creative city; cultural planning

**Introduction**

This article discusses conceptual and empirical possibilities for Geographic Information Technologies in cultural research. We presume that many readers know little or nothing about Geographic Information Technologies and their potential use for cultural research (and henceforth apologize for discussing that which might seem obvious to those who do). Judging from a symposium on Geographic Information Technologies for cultural research we hosted at the University of Wollongong in 2008 — at which cultural researchers from backgrounds in history, media and communications studies, sociology, cultural geography, anthropology and cultural studies were in attendance — there is a growing interest in how they can be used in humanities and social
science research, but confusion reigns regarding software, necessary skills and expertise. Curiosity has generally failed to translate into uptake in actual research projects.

Responding to this, we spend a portion of our article explaining what Geographic Information Technologies are and what kind of devices, data, methods and sources can be integrated via them (from basic freeware/web mapping through to full proprietary software/hardware systems for geographic information). We then highlight cultural research applications of Geographic Information Technologies with examples from our own work, where these technologies have been used to either respond to existing conceptual or empirical weaknesses, to explore new research questions, or to facilitate engagement between cultural research and audiences beyond the academy, in government and the community sector. Our uses of Geographic Information Technologies are in an Australian context (and in particular local circumstances within Australia), where existing models of research prove limited. Geographic Information Technologies have provided a means to circumnavigate known empirical problems and to open up new kinds of dialogues with research partners and communities.

We are also mindful of the limitations and problems of using Geographic Information Technologies in cultural research (problems both practical and ethical in nature – see Schuurman, 2000), and thus at times we make important caveats. Overall, however, our argument is that when properly understood as flexible technologies enabling the gathering and communication of geographical narratives, Geographic Information Technologies can be used in cultural research to meaningful ends. Using Geographic Information Technologies foregrounds the spatial dimension of material cultural processes and activities and, because of this, Geographic Information Technologies enable some measure of “lateral” perspective on existing cultural research questions.

What are Geographic Information Technologies?

Geographic Information Technologies comprise a suite of evolving technologies and terminologies all aimed at gathering and displaying information spatially, in a map. Given the rapid pace of development particularly in the online realm, currently no singular term exists that encapsulates all the technologies we wish to discuss. Rather than attempting to add to already crowded lists of terms, we use the phrase Geographic Information Technologies to encompass Geographic Information Systems (GIS), Global Positioning Systems (GPS), remote sensing and mapping conducted on the Internet (Geoweb). The more expert-user oriented of these technologies (GIS, GPS, remote sensing) are often referred to as Geospatial Technology (GT) by those working in the fields of geomatics and GIScience (the science underlying GIS applications and systems). In parallel, the expanding growth in web mapping applications has its own group of evolving and interchangeable terminologies (Geoweb, Neogeography, web mapping, GIS 2.0, wiki mapping) (see Elwood, 2009; Haklay et al., 2008 for a full discussion). All these types of Geographical Information Technologies provide possibilities for cultural research (Table 1). Both highly technical and simple/amateur Geographical Information Technologies produce maps that can in turn be inserted into research agendas. Accordingly, as this article seeks to write across these areas, we have chosen “Geographical Information Technologies” as shorthand for both Geospatial Technologies and the Geoweb (Table 1).

GIS refers to a “Geographic Information System”, which is a collection of people, hardware, software and spatial data supporting research, information management and retrieval – usually through computer programs that allow information in map form to be analysed statistically (through an embedded database) and spatially (through software extensions designed to perform particular geometric algorithms). Critically, GIS has developed to date in institutional contexts where technical expertise, funding capacity, and scientific exigency have shaped its character and format (Brown, 2007). GIS technologies are historically contingent, having emerged
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<th>Type of GIT</th>
<th>Example</th>
<th>Requirements</th>
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<th>Potential applications</th>
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<tr>
<td>Global Positioning</td>
<td>Handheld GPS devices</td>
<td>Purchase of GPS device, connectors for downloading data and matching software</td>
<td>Record the latitude/longitude co-ordinates of points on the earth’s surface (as well as altitude and time), based on triangulation of satellite readings of one’s position</td>
<td>Use in ethnographic and participant observation field work settings, such as mapping of Aboriginal significant sites, location of heritage buildings, the movement of people and things through geographical space</td>
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<td>Systems (GPS)</td>
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<tr>
<td>Web 2.0 mapping</td>
<td>Google Earth Google Maps</td>
<td>Computer and Internet connection, No prior knowledge of map projections, Users agree to Google terms and conditions</td>
<td>Map interface generated by Google’s own global geo-referenced base layers (satellite image, street networks), Pin information to Google base layers in point form (latitude/longitude coordinates), including words, photographs, videos, symbols, URL addresses, Some functionality to draw polygons and emerging spatial analysis features</td>
<td>Accumulating point data on cultural facilities, venues, Creating customized maps of point data relating to important sites, heritage, artefacts, types of cultural businesses, Simplified community-generated content – whereby participants pin points onto a map online</td>
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Table 1.  (Continued)

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<th>Type of GIS</th>
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<tr>
<td>Proprietary GIS software</td>
<td>ESRI-ArcGIS</td>
<td>Internet connection</td>
<td>Internal structure of map, database and graphic design windows (the latter for map layout design)</td>
<td>In addition to the above potential applications of Web 2.0 mapping:</td>
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<td>MapInfo Professional</td>
<td>Computer with fast processor and (potentially) large amounts of memory</td>
<td>Geographical data can be observed, manipulated and analysed in one or simultaneously in all windows</td>
<td>• scan hard copy maps (based on existing geo-referenced maps with known co-ordinates) and use research participants’ markings on those maps as the basis of analysis</td>
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<td>Technical support in data licensing</td>
<td>Compile numerous base layers together in a customized fashion, and add new layers to these generated by empirical research (including pinning point data, drawing lines and polygons)</td>
<td>• use database features to perform statistical analysis</td>
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<td>Technical training in spatial science (e.g., map projections, data formats, metadata protocols, spatial analysis techniques)</td>
<td>Integrate vector (e.g., point or polygon data) and raster data (e.g., satellite photo) formats within one map document</td>
<td>• perform specialized spatial techniques such as cluster analysis (“how much do like or different things cluster together in geographical space?”) and network analysis (“how are different entities across space connected through networks?”)</td>
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<td>Link maps to relational databases</td>
<td>• combine community generated maps with other social data (e.g., census data, which can be mapped to selected boundary layers)</td>
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<td>Perform analysis on one or more layers simultaneously</td>
<td>• use a map as an organizing tool to integrate different qualitative and quantitative data types into a single interoperable product</td>
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<td>Link photographs, audio clips and video clips (geo-referenced) to maps</td>
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<td></td>
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<td>Ability to program unique, tailored extensions for particular functions</td>
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from particular technical-social settings, namely within a positivist/masculinist epistemological framework (Kwan, 2002). Conventional GIS involves expensive software, highly trained analysts and support staff, internally coherent (but often externally obfuscatory) languages, and pre-requisite knowledge of the science of spatial mathematics and concepts (from map projection to various statistical techniques such as cluster analysis and least-cost path modelling).

What this means in practice is that conventional GIS has tended to be located on university campuses in departments of geography, environmental science, surveying and engineering, and advanced by researchers addressing questions of environmental change, ecological disturbance, climate dynamics, infrastructure provision, and demographic modelling. Software developers such as ESRI and MapInfo have responded to these core user groups and developed extensions to suit their needs. As a result, fully integrated GIS technologies have the ability to compute spatial analysis in an advanced statistical fashion based on location, distance, proximity, and programmed queries and selections. These forms of GIS enable modelling of changes in earth surface phenomena across geographical space through time, using combinations of data types, in addition to a range of statistical functions normally associated with databases. Only in the last decade have social and cultural research applications of GIS begun to be explored, overcoming substantial barriers to entry and technical challenges (see below).

Global Positioning Systems (GPS) are technologies designed to capture, store and transmit information about the relative location of things in space — as measured on the earth’s surface. GPS technologies involve orbiting satellites that transmit signals from space — signals that are used by GPS units (including hand-held GPS tracking devices, data loggers, mobile phones and in-car satellite navigation devices) to calculate latitude, longitude, altitude and time. Primarily developed to assist navigation, GPS technologies are now increasingly ubiquitous in a range of scientific endeavours, from archaeology to ecology, and in popular culture, where they have spawned a range of everyday uses (especially through mobile phones and cameras) and catalysed user-generated communities (who share spatially logged information, photos, reviews and tweets — often via social networking websites). Creative artists have explored GPS to map emotion (Nold, 2007) and track daily movements (Belasco Rodgers, 2009; Parks, 2001; Waag Society, 2002) in ways that introduce the possibility of “subject(ive) mapping” whereby embodied practices are brought into the discourse of mapping, challenging the objective nature of the map by inflecting it with personal movement (Kwan, 2007).

In parallel (and somewhat in competition) with the development of GIS and GPS, are various Web 2.0 mapping platforms (what Elwood, 2009, p. 257 calls “‘not-quite-GIS’ assemblages of hardware, software, and functionalities”) that feature minimal technical barriers, require no prior knowledge of map projections or spatial analysis techniques, and which appeal to users through their ubiquity and flexibility. Web 2.0 mapping platforms include Google Maps, Google Earth and Wikimapia. These developed as commercial platforms aimed at the general public rather than “expert” users, geared around online access, multimedia possibilities and capacity for individuals anywhere to upload their own information and connect it to a map. They are especially useful for linking to the data generated by handheld GPS units. Many “rely on application programming interfaces (APIs), code that users may incorporate or ‘mash up’ into their own program, website or service” (Elwood, 2009, p. 258). Wiki mapping, geo-visualization application programming interfaces and web geo-tagging “share something in common with geographic information systems, in so far as they play a part in the digital storage, retrieval, and visualization of information based upon its geographic content” (p. 257), but vary considerably in terms of functionality — more reliant on a web map interface, and without conventional GIS technology’s database synchronicity, graphic design layout windows or spatial/statistical analysis and modelling extensions.

Geared around public participation, volunteered geo-coded data and links to URL addresses, photos and videos, the Geoweb enables the generation of more anarchic and organic knowledge
of places – what have variously been called “neo-geographies”, “volunteered geographies” and “citizen science” (Elwood, 2009; Haklay et al., 2008). These have grown beyond the academy as Internet users upload all manner of information to be stored and accessed via maps. Examples are diverse: a map of the history of punk music and sub-culture in Washington DC (http://yellowarrow.net/capitolofpunk/); cataloguing of graffiti art in south central Los Angeles (www.communitywalk.com/scbombs); and, in a vivid example discussed by Elwood (2009), user-generated maps of “bad neighbours” (www.rottenneighbors.com). Web mapping reproduces variety and re-frames the scuffles of contemporary culture, much like social networking technologies, with little concern for accuracy or scientific rigour.

**Culture and politics: placing Geographical Information Technologies**

Some commentators from within academic geography have emphasized the empowerment potential of Geographical Information Technologies, echoing earlier calls for the use of proprietary GIS software to emancipatory ends (see Goodchild, 2007) and harking back even further to Yi-Fu Tuan’s now-classic (1975) method of the participatory mental map as means to document everyday psycho-geographical perceptions of the city. Others have criticized their privatization of online representation of geographical space (see Zook & Graham, 2007) and discussed the political economy of Google (in particular) as a monopoly player in the creation and pervasiveness of geo-coded digital data (Miller, 2006).

A challenge – and opportunity – for researchers using Web 2.0 technologies stems from the “tremendously heterogeneous” (Elwood, 2009, p. 257) knowledges they generate, and technical and ethical problems concerning how to access and use publicly generated spatial data in further research and analysis. Transferring data generated in Web 2.0 platforms into conventional GIS for later statistical or spatial analysis is technically difficult, if not impossible in some cases due to privacy concerns and the presence of code specifically designed to remain wholly controlled by website companies. Moreover, public maps generated in Web 2.0 platforms exponentially expand the possible “muddle” of data, not just of data types, but of the manner in which meaning, symbols and words are used to describe similar and different things in the “real world”. Without systematic coding, the inherent polyvocality of public perception and experiences of everyday life is reproduced in the map: “[t]he data created with new geovisualization technologies are likely to present a vexing conundrum: unprecedented volumes of data and unprecedented levels of heterogeneity” (Elwood, 2009, p. 259).

Notwithstanding these technical and conceptual difficulties, Web 2.0 mapping has been adopted by humanities and social science researchers as a means to develop cultural knowledges about place. In some cases, as with conventional GIS, the process is as important as the potential for subsequent analysis, as part of participatory public cultural research. “Rescue geography” (www.rescuegeography.org.uk/default.htm) is a collaborative research project based at the Universities of Manchester and Birmingham, involving interviewing past residents of Birmingham’s Eastside District about their time spent living there, prior to a planned redevelopment. It is a methodological trial that is combining walking interviews with GPS points, to see if place and ambient noise influence responses. Similarly, researchers at Northumbria have developed a project that encourages students and members of the public to record their everyday walks around Newcastle-Upon-Tyne (www.northumbria.ac.uk/mywalks). It aims to get participants thinking about that which surrounds them, that they normally don’t notice – the mundane and taken for granted spaces and sites they encounter. Trails have links to multimedia for particular points along each trail. In both conventional GIS and Web 2.0 platforms there are opportunities to extend empirical alternatives to the conventional binaristic models (qualitative vs. quantitative; positivistic vs. deconstructive) that have suffocated social science research.
But rather than see Geographic Information Technologies as a mere “problem-solving” tools brought down off the shelf when needed, we advocate a relational understanding of how technologies (such as GIS), people, non-human actors and political motivations intertwine in the doing of research. Thinking more holistically, Geographic Information Technologies – like any other research tools – are inserted into research agendas that are already peopled and established within discipline boundaries, within particular governmental objectives, within methodological and political or paradigmatic debates (Rose-Redwood, 2006; Schuurman, 2004). Geographic Information Technologies are used by researchers who themselves are already situated relationally with their research “subjects”, funding bodies, governmental policy makers and so on (Brown & Knopp, 2008). Geographic Information Technologies are not so much adopted to fill a methodological gap, but rather to further particular research agendas, to create possibilities of new research questions, and to answer or generate new critical policy debates. Geographic Information Technologies involve computers, satellites and maps, but are also “complex arrays of social and political practices … ways of knowing and making knowledge” (Elwood, 2009, p. 257). What matters is not so much the pros and cons of Geographic Information Technologies as software and hardware tools (though researchers should be aware of these), but rather the manner in which Geographic Information Technologies can be integrated into research agendas (and subsequently influence them) and engage with policy debates already populated by people, politics and perspectives.

How Geographic Information Technologies have been understood and engaged with by critical scholars has influenced how they are applied as a tool for cultural research. During the 1990s, early critiques were levelled at the epistemological basis of GIS as a tool of positivist science, unable to reconcile its technological limitations against attendant social and political limitations (Elwood, 2006b). Expanding on work in critical cartography, which had unpacked maps as representations of social relations (Harley, 1992; Wood, 2002), a new field of “critical GIS” extended this notion of maps as socially constructed entities, characterizing GIS as a controlling technology, perpetuating power relations by restricting access only to expert users in industry and large institutions (Crampton, 2009; Pickles, 1995). The corresponding development of Public Participation GIS (PPGIS) – an anti-corporatist, post-colonial and community-based set of GIS practices – sought technological democratization, opening up GIS methods to community groups to gather and analyse their own data (Pavlovskaya & St. Martin, 2007; Schuurman, 2000). Towards the end of the 1990s, the engagement of GIS by feminist scholars interested in this technology allowed for even more nuanced analyses of power relations (e.g., Knigge & Cope, 2006; Kwan, 2002, 2007), whereby GIS technology could be used to resist oppressions:

[f]eminist GIS users are committed to non-positivist practices of knowledge production and are sensitive to gender and other power hierarchies that produce social, economic, and cultural difference. These scholars have been creating “feminist cartographies”, practicing “feminist visualization”, and developing new mapping alternatives to mainstream cartographic and GIS representations. (Pavlovskaya & St. Martin, 2007, p. 584)

In being open to critique, the practice of GIScience has continued to combine contradictory technologies and social practices while simultaneously expanding its theoretical frameworks and applications (Elwood, 2006b). As Kwan (2007, p. 26) explained in relation to using GPS units in feminist research:

[w]hen used as a technology of self-reflection, GPS invites the user to see herself as a subject in motion, as an author and a reader, reflexively inscribing personal trajectories onto the text of the social world of her everyday life. In this light, GPS receivers can be used as technologies of self-expression, creating spatial interpretation and social understanding as much as they can be used as tracking and monitoring devices.
This sense of opening up theoretical and practical possibilities has further expanded through research collaborations with cultural geographers; the commercial encroachment of GPS chips into a range of everyday mobile technologies; and the continued rise of social networking technologies. Among a growing list of examples of applications of Geographical Information Technologies for cultural research are: participant action research in urban planning and use of mapping in community empowerment (Elwood, 2006a); mapping of gay and lesbian histories in urban neighbourhoods, informed by queer theory (Brown & Knopp, 2008); demographic mapping of same-sex couples and sexual citizenship (Gorman-Murray, Brennan-Horley, McLean, Waitt, & Gibson, 2010); mapping of environmental cultures in rural regions witnessing profound demographic change (Lake, 2009); critical work on the racialization of maps in post-Katrina New Orleans (Crutcher & Zook, 2009); on tracking the gendered nature of movements through city spaces (Kwan, 2002); and historical research on the everyday practices and spaces of movie-going (Klenotic, 2008).

GIS can involve digital interpretation of ethnographic data, represent local knowledges and display the views of multiple voices, all common techniques to critical researchers (Kwan, 2002). GIS has been used in this way to examine perceptions of fear and safety (Mattei, Ball-Rokeach, & Qiu, 2001), to complement quantitative GIS techniques in relation to the effect of street lighting on crime and fear (Pain, MacFarlane, Turner, & Gill, 2006), for aiding grounded visualization strategies when studying community gardens (Knigge & Cope, 2006) and as an input to youth planning strategies (Dennis, 2006). In another example, differently abled people in Barcelona and Geneva “used GPS-enabled mobile phones to photograph obstacles and architectural barriers they found in the streets and to create a real-time, web-based accessibility map of their cities” (http://www.megafone.net/INFO). In such cases, mapping as process was often of equal importance to maps as research outcomes, with ethical considerations paramount. Sarah Elwood’s work, for instance, illustrates how GIS might facilitate incorporation of grass-roots perspectives into urban planning decisions (amidst contradictions): in the case of Gorman-Murray et al.’s (2010) mapping of same-sex couple families, a fairly orthodox application of GIS was adopted (to analyse cultural data from the national census), not as a means to advance mapping methods per se, but instead to highlight the presence of significant suburban and regional concentrations of same-sex couples, thus contesting assumptions about same-sex couples’ inner-city residential choices (with implications for service provision and the effective operationalization of equal rights legislation).

As a tool then for cultural research, Geographical Information Technologies most helpfully catalyse a “collision of epistemologies” (Brown & Knopf, 2008, p. 41) – between paradigms, between methods, and between researchers and audiences who have different expectations of what constitutes “evidence” and research “process”. In these collisions of paradigm and approach, new and uncertain research possibilities emerge around maps. Maps are the product, but they are more than objects; they are performances born of research processes with particular aims and motivations (Crampton, 2009). Geographical Information Technologies and the maps produced by them are what researchers, communities and people in institutions invest them to become, and how they are put to use. Geographical Information Technologies (and resistances to their use) therefore reflect institutional cultures, politics and aspirations.

The three examples we describe here are from research projects where our motivations were to use Geographical Information Technologies to enable a particular kind of cultural mapping in the context of creative-city research and policy making. Creative city research has burgeoned in recent years, fuelled by the popularity of key books and consultant “experts” such as Richard Florida and Charles Landry (Gibson & Klocker, 2004), but also because of the increasing recognition of the sophistication and significance of creative activities to the economic fate of cities and regions. However, as we discuss below in relation to the specific projects, practical, ethical and
conceptual problems have plagued many attempts to develop empirical methods to measure and understand the creative city. Our projects sought to undertake creative city research and address ethical and empirical problems, using mapping as a central method. From our examples we hope that other cultural researchers might consider how thinking spatially, and using maps as performative research tools, can inform progressive research agendas.

Geographical Information Technologies for cultural mapping and creative city research

Our first two examples are from creative city and cultural planning research projects that required in-depth empirical research to better understand how creative and cultural life emerges in specific geographical circumstances. Government and community audiences were explicitly identified, but they were more than policy-oriented consultancies, resting on long time periods to undertake empirical research (3–5 years) and fully informed by critical academic literatures. In them, we wished to explore our preferred qualitative methods – methods such as ethnography, affective and relational geography that might be criticized as “impractical” or “fluffy”, but which we saw as necessary to solve certain conceptual problems (see below) and produce defensible “data” that could genuinely inform dialogues with actors beyond the academy. We argue that GIS was one means to render otherwise non-numerical information “empirical”, to “speak” to those community members and policy makers otherwise sceptical of cultural research. The final example stems from our involvement in a collaborative public research exercise with an arts festival in Sydney, conducted in partnership with a design company that specialized in visualizing GPS data. That project was very much conceived as a public experiment within a festival context (rather than being a “pure” research project), where we were interested in mapping creative workers’ daily lives by integrating GPS and GIS alongside other specialized visualization software – and discussing the results at the festival in a free public lecture.

Mapping creative Darwin: the anatomy of creativity in the city

Our first project (see http://www.cdu.edu.au/sspr/Creative_Tropical_City.html) used a proprietary GIS software platform to answer questions of where creativity is located in the city. Existing research on geographies of creativity in the city have relied on proxy data forms: mapping data on firms and/or employment in the creative industry sectors (e.g., Gibson, Murphy, & Freestone, 2002; Markusen, Wassall, DeNatale, & Cohen, 2008; Watson, 2008). Such previous studies are useful because they give some indication of the geographical spread and significance of creative activities in cities, and help answer questions about the locational preferences of creative industries, including their gravitational pull towards each other in an agglomerative sense. However, such studies rely on (usually) one data source to reveal the presence of creative activities, rather than detail how creativity is itself apparent, or embedded in the spaces, networks and activities of the city (see Brennan-Horley & Gibson, 2009). The latter, more qualitative aspects of the lived experience of creativity can only be inferred from the data on employment and firm location.

Furthermore, critical problems persist with commonly used data sources, problems that threaten the very integrity of the maps on which analysis is often based. Census methods of data collection, for instance, seriously under-enumerate employment in creative sectors where large amounts of informal and intermittent employment, mixed work and subordinate creative work are present – where an individual’s creative work occupies less time than other “day jobs” (Gibson et al., 2002; Karttunen, 2001; Throsby, 2001). Music, art, acting and writing are particularly under-represented in census data. Similarly, mapping business location counts misses
individuals operating in creative sectors without registered business names or numbers (thus excluding more radical or “fringe” groups). The result is that geographical locations with higher presences of more formalized, commercial sectors, those places with more people employed in stable, weekly waged jobs, and registered businesses, appear comparatively “more creative” than those where more informal and “hidden” forms of creativity exist. In contrast to such studies, other researchers have promoted ethnographic methods (Drake, 2003; Short-hose, 2004) including interviewing, snowballing through contacts and participant observation, as means to get “inside” creative industries and to better understand their embeddedness in place and networks of social relations. Such methods provide rich explanation of the internal dynamics and social logics of creative production, but having stemmed from text-based recorded interviews, produce data that lack the geographical co-ordinates necessary to be mapped in the manner of employment or business location data – and thus remain comparatively “aspatial”, with no numerical or statistical component.

In the Darwin project, we developed a technique for combining ethnographic methods with GIS, integrating spatially sensitive questions into interview schedules, and prompting interviewees (98 creative practitioners from 46 different creative fields as diverse as music, dance, film, whip-making and tattooing) to draw on hard-copy paper maps of Darwin as they described their creative lives, their movements through the city, and perceptions of creative activities and inspirational spaces in their city (Figure 1). Responses from interviews in 2007–2008 were then scanned, with drawn markings on maps digitized in a proprietary GIS and subsequently accumulated across all interviews.

Space is not sufficient here to outline a full explanation of the technical methods used (see instead Brennan-Horley, 2010; Brennan-Horley & Gibson, 2009), but what is worth highlighting are the kinds of analysis made possible in a conventional GIS, the stories about creativity in the city they revealed and how our maps took on a performative dimension as empirical evidence in the context of a government-funded research project.

One question in interviews asked participants to locate their places of work on a map. Our intention here was to uncover the everyday movements of creative workers, the spaces used in creative life, and how these intersected at the city-wide scale across diverse creative sectors. What immediately became apparent from asking participants to draw on hard-copy maps of Darwin as they answered this question was that sites of work were numerous (averaging five different work sites per interviewee), geographically dispersed and heterogeneous (Figure 2). Whereas mapping census data or business counts emphasizes inner-city concentration and implies single workplaces, this method revealed the multiple spaces of creative life across the city (with substantial activity beyond the inner-city, in outlying suburbs, and between and across inner, middle and outer suburbs – cf. Felton, Collis, & Graham, 2010), and how these were connected in interviewees’ regular practice. “Mundane” sites of social networking were revealed (such as the paint aisle of the city’s hardware superstore, important for visual artists), as well as the temporal variations in creative work apparent between, for instance, musicians (who use studios, stages and rehearsal spaces at night) and architects (with more conventional city office/daytime routines).

Another question asked participants to draw on the map (and describe in words) the places they visited to seek inspiration. This was deemed important because of previous ethnographic work having emphasized the affective, emotional relationship that exists between creative artists and place, which if fostered could be a factor in supporting the growth and diversification of creative industries in cities and regions (Drake, 2003; Florida, 2008). Results enabled the mapping of sensory dimensions of the city; how creative artists use the city differently from “everyday” work activities, in seeking creative inspiration (Figure 3). The patterns revealed were distinct from those in response to our question about work sites, and different again from
further questions about creative epicentres, travel patterns and leisure time. Featuring highly were aspects of the natural environment including Darwin’s beaches, coastal mangrove swamps, bays and streams, as well as prominent city parks and open spaces (for further explanation of results of this question, see Brennan-Horley, Luckman, Gibson, & Willoughby-Smith, 2010). Such sites of
inspiration, subject to development pressures and debates about physical expansion of the city of Darwin (and normally defended via equity or ecological arguments about public good, intrinsic value of nature etc.) were revealed to play an important role in the anatomy of the city’s creative economy. Again, here were layers of the geography of creativity in the city not possible to reveal through conventional mapping of census or employment data.

Figure 2. Gross “flows” of creative sites in Darwin, 2007–2008 – based on answers to questions about where work sites are located in the city. Lines represent connections between work sites in each suburb within interviewees’ responses to the question. Darker lines are the more frequently drawn networks of work sites. Numbers in parentheses equal the count of major workplaces within the statistical local area boundary. Source: Brennan-Horley (2010, p. 48).
Although the empirical stages of this project have concluded, dialogues with government and various community sectors in Darwin have continued to unfurl. What is pertinent to reflect upon here is the manner in which the knowledges generated, and in particular the maps produced, have thus far had a performative quality. The maps featured heavily in a public launch of the project’s findings at the Northern Territory library (part of the Territory parliament building in Darwin), and were on display through an extended period as part of a professionally curated exhibition there. A multimedia video clip was produced explaining the mapping methodology; it was

shown at the launch and is publicly available online (http://www.creativetropicalcity.blogspot.com/). For audiences in government, GIS proved a way to package up research in ways that suited its quantitative imperatives (obsessed as governments are with auditing, counting, ranking creative places etc.; Christophers, 2007), and yet from our perspective, also nurture a critical, questioning perspective on assumptions about creative industries, what they constitute, and where they are found. This was critical cultural research communicated in a manner digestible to policy makers, made empirical. Nationwide media coverage ensued, especially based around the finding that mundane sites of networking such as hardware stores and post offices were more prominent than clichéd sites of bohemia. Because the map objects (interviewees’ scribbles on maps) were also a database in which information could be stored, accumulated, compared and tested, we took a mercurial concept like inspiration (the idea that affective relations exist between humans and the environment) and transformed it into a tangible, viewable representation of reality. GIS made possible the statistical analysis of quantitative data generated by ethnographic methods otherwise principally geared towards understanding qualitative phenomena.

**Cultural asset mapping: vernacular creativity and local pride**

Our second project, Cultural Asset Mapping for Regional Australia (CAMRA; http://culturemap.org.au/), built on experiences in the Darwin creative city mapping project, in the broader context of cultural planning for regional and remote parts of Australia. Again funded by the Australian Research Council (2008–2012), this project also brings together the Federal Government’s peak arts agency (the Australia Council for the Arts), local councils (in Wollongong, Albury-Wodonga, Armidale, Uralla and Central Darling Shire), the NSW Local Government and Shires Association, and non-government arts organizations (Regional Arts NSW) as part of a co-ordinated partnership programme of research. Conceptually, the project began with an interest in the role that culture and the arts play in planning, regional development and localized narratives of place identity. Cognizant of critiques of creative city research (that demonstrate how creativity has been frequently non-liberalized (turned into a pro-capitalist agenda), favouring some forms of creativity over others, of it privileging inner-city urban locations over places perceived to be “uncreative” – see Edensor, Leslie, Millington, & Rantisi, 2009; Gibson & Klocker, 2005; Luckman, Gibson, & Lea, 2009; Wilson & Keil, 2008), the ARC Cultural Asset Mapping project sought to start from an alternative vantage point, seeking community-generated knowledge on what constitute cultural assets in regional, rural and remote parts of Australia – locations that are vastly different to the densely populated centres that typically feature in creative city research emanating from the northern hemisphere.

With low populations, sparse geography, reliance on traditional agriculture and manufacturing industries, the regional, rural and remote places featuring in the project are not typically identified as “creative” in the imaginary geographies of arts and creativity in Australia (Gibson, 2010). One, Wollongong, is an iconic “steel city” with a functioning steel mill, smelters and an expanding industrial port; one is a remote area (Darling Shire) with high Aboriginal population and distressing measures of social disadvantage; another is a “country town” (Armidale) in the sheep-wheat belt, with a long tradition of private schools and colleges; and the final case study, Albury-Wodonga, is a river town saddling the NSW-Victorian border. In each case, business and employment statistics on creative industries were of very limited utility, being unreliable because of small numbers per category (a function of overall small population in these places, and resulting in what the Australian Bureau of Statistics call “randomizing” to protect anonymity, but which in practice produce “dummy” numbers), or simply showing next to no creative industry activity at all.
Moreover, in some of these locations, it is extremely difficult to identify industry sectors resembling the creative industries as they have come to be understood internationally. More vernacular understandings of creativity are required, outside of standardized industry classification schemes, embedded in the social life of rural and industrial places – to capture practices as diverse as community gardening, Aboriginal hip-hop, knitting groups, custom car design, postcard illustrations, clothes swap parties and food tourism (see Edensor et al., 2009; Mayes, 2010; Warren & Evitt, 2010). Our shift towards cultural assets in the CAMRA project was an attempt to escape the framing confines of “creative” industry research and instead open opportunities for communities to define what creativity might be and, more broadly, what cultural aspects, features, attitudes or even feelings pervade their place and are valued accordingly.

For the CAMRA project, we mutated the method used in the Darwin creative city mapping project for one case study: hard-copy maps were used as the basis of a community cultural mapping exercise conducted at Wollongong’s largest annual festival, the Viva La Gong Festival, in November 2009. In the lead up to the festival, professionally designed postcards were distributed around local cafés to advertise the research, and one researcher was prominent in local television, radio and print media inviting members of the general public to come to the festival to take part in the research. The angle taken was to ask the general public a very small number of short, engaging questions (Where is “cool” Wollongong? Where is “creative” Wollongong?). The hope was that these questions, although clearly articulated in a “pop culture” format, could be combined with a mapping methodology in such a way as to reveal local cultural activities, feeling and preferences – and, in doing so, enable a larger picture to emerge of cultural planning needs and alternatives for Wollongong.

At the festival, a stall staffed by five CAMRA project researchers was decorated with posters and maps; passers-by were invited to participate via a recorded “vox-pop” interview, and asked to draw on a hard-copy paper map of Wollongong where they thought “cool” and “creative” places were – and what made them so (Figure 4). No pre-determined ideas of what constituted “creative” were assumed (indeed, interviewers at the festival encouraged participants to think laterally, to list literally anything they considered to be “creative”), and participants were free to answer as briefly or as comprehensively as they wished.

As with the Darwin project, there is not the space here to discuss fully the methodology, breakdown of results and technical steps undertaken, but brief consideration of the maps generated reveal the contours of a public geography of cultural activity in Wollongong (Figures 5 and 6). One hundred and sixty maps were completed on the day of the festival (representing the views of about 250 people – many single maps were drawn by two people combining both of their responses), and over 900 “cool” and “creative” places were drawn on these maps. Recorded interviews accompanying the maps varied in length from 3 to 45 minutes, with respondents stemming from diverse demographic backgrounds, including whole families in some cases, as well as young adults, retirees, farmers, Buddhist monks (Wollongong happens to be a major centre of Buddhism, featuring Australia’s largest temple) and many well-known figures in the regional Aboriginal community. The average age of participants was 41, with a youngest age of 8, and an oldest age of 80. More women (62%) participated than men (38%). Frequently participants mentioned that they had seen recent television media coverage and were keen to “draw on a map and have their say”.

After the data gathering was complete, drawn maps were scanned and digitized in a GIS (as in the Darwin research) and combined for analysis. Overall results show that what are perceived as “creative” places are often not always the same as “cool” places: respondents most frequently identified “creative” places as those parts of the city centre with high-profile cultural institutions (such as the eastern part of Wollongong CBD, which houses the city art gallery, theatre/performing arts centre, entertainment centre as well as cafés and restaurants), and a northern strip of
beachside villages from Thirroul to Stanwell Park considered “arty” because of the well-known creative communities based there (Figure 5; Waitt & Gibson, 2009). But cool places (Figure 6) were more dispersed, were frequently parts of the region enjoyed for natural amenity (beaches, mountains, the region’s prominent escarpment, which is part of a chain of national parks in the area) and were more closely linked to people’s own residential location and cultural activities. Participants themselves involved in surfing, knitting groups, local choirs, amateur theatres, skateboarding scenes, community gardens (including some illegally established on fragments of public land otherwise neglected by local authorities) tended to list “their” places as “cool”, reflecting a high degree of localized cultural activity and attachment in Wollongong.
At the time of writing these results have not yet been extensively reported to government research partners or cultural planners in the region, and further analysis is underway. But even a cursory reflection on the findings suggests how they might be useful: diverse vernacular forms of creativity are present, and a high degree of localism pervades the city, with respondents

Figure 5. Where is “creative” Wollongong? This map shows the combined drawings of 160 maps. Each drawing on the map is an enclosed polygon.
tending to identify cool places within five kilometres of home (an especially “local” pattern, given Wollongong’s linear geography, stretching for 50 kilometres in a thin strip along the coast, hemmed in by escarpment). These qualities invite cultural planners to think in a flexible and decentralized manner about cultural infrastructure provision. Whereas predictable, high visibility

Figure 6. Where is “cool” Wollongong? This map shows the combined drawings of 160 maps. Each drawing on the map is an enclosed polygon.
“creative” spaces were readily identified by participants (wherever they were in the region), these same spaces may not regularly engage the whole city’s population in a more everyday manner and thus did not show up so often as “cool”. Our maps and interviews, by contrast, tracked some measure of grass-roots cultural activity, and the spaces valued for this. Should local councils provide centralized “flagship” venues, or dispersed, flexible community facilities? Our maps go some way to informing debate about this question.

“Catch and release”: tracking Sydney’s creative industries

Our final example used GPS technology to find other ways to “see” the creative city, as part of a collaborative, public research exercise. Playfully entitled “catch and release”, the collaboration grew from conversations between two of this article’s authors, the director of a major arts festival in Sydney focused on creativity, and GPS Create, a Sydney-based company specializing in GPS data visualization. The plan was to recruit and “tag” a small number of creative workers with a GPS and track their movements over a single day, involving these creative workers in the research as “citizen cartographers” (Propen, 2006) – effectively drawing the city through their movements. Their tracks were to be integrated together with GIS and other specialized software into an animated map and artwork of a day in the life of creative Sydney, which could be used as the focus of a public panel lecture for the festival. As geographers, we hoped that by attempting a “David Attenborough style” tracking exercise we could uncover new information about the day-to-day patterns of creative work, and perhaps challenge assumptions about where creativity is found in Sydney.

Our sample focused on one type of creative worker – designers – fully knowing that it did not represent all of the creative industries, but would at least enable some early patterns to emerge across a tightly defined group. All participants were recruited through the festival’s networks, with 14 taking part in the first run of the experiment. Each participant was provided with a QStarz GPS unit to carry with them as they went about their daily activities (the unit’s simple design needed participants only to turn them on and off and hand back to the researchers when finished). Originally participants were asked to record for one day, but after initial data visualization and reflection, we decided to extend the recording period to a couple of days to provide more detailed data about day to day patterns. Upon returning the GPS units, data was downloaded and collated together using a proprietary GIS.

Figure 7 displays a GIS output map of all 14 tracks overlaid concurrently. GPS Create used the same data to visualize participants moving about the city in real time (http://gpscreate.com/catch_and_release/). The results revealed an identifiable point of gravity for this one group of creative workers: the inner-city suburb of Surry Hills, orbiting Sydney’s central railway station. Hence, a story was generated at the festival and in subsequent media coverage (Tovey, 2010) and online discussion about Surry Hills as the design hub of Sydney. The data did seem to suggest this with the visible clustering of tracks. In a way, our research backed up the predictable hypothesis that creativity is found in densely populated inner-city, ex-industrial districts (Surry Hills is Sydney’s original garment district). This story was repeated in our map of the speed of participants’ movements (Figure 8), which showed slowest movements again in and around Surry Hills. However, crisscrossing tracks are not necessarily the same as meaningful activity or interaction. That Sydney’s transport system converges on the central railway station meant that some of the tracks necessarily converged in this area as participants tried to make their way across the city (and in fact, undertaking little or no actual activity in Surry Hills itself). Movements through Surry Hills without stopping to interact or do business would most likely slow down anyway (the road traffic being very dense in this part of the city) and transport mode switches between rail, buses and walking have to take place here too. Therefore, in a sense, patterns of work and movement for designers are probably not all that different from workers in other industries, like
couriers, salespeople or trades workers – that operate across Sydney. They all get funnelled
together through the same points in the transport network.

GPS tracking therefore identified an everyday, almost mundane geography of creativity. Watching participants negotiating the transport system is what we see on the maps, as much as any ecology of creativity. Indeed, equally possible to read from the maps is an alternative story that counteracts the inner-city/creative hub hypothesis: there is no “milieu effect” of creative professionals living and working in one part of the city. Two participants did seem to be living the urban village script, residing and working in close proximity, but it was not the case for most.

Figure 7. Catch and release: creative worker movements, Sydney, 2010. All GPS tracks overlaid concurrently, with inset map of city zone shown below.
Conclusion

There is an ever-present tension between Geographical Information Technologies as enabling technologies and as instruments of totalitarianism. Maps are instruments of control, but they can also be exciting, evocative, and potentially empowering. Geographical Information Technologies – as a means to produce maps – can make the invisible visible, tracing contours of emotional and affective links to city spaces and re-representing these in a format beyond words and numbers, as maps that elicit spatially registered responses in viewers. Anything can be mapped, hypothetically – although as we discuss here, technical platforms and possibilities vary and Geographical Information

Figure 8. Catch and release: creative worker movements, Sydney, 2010. All GPS tracks overlaid concurrently and visualized by speed data, with inset map of city zone.
Technologies should not be expected to solve all problems in research. There is in Geographical Information Technologies the danger of infinite accumulation of information, of everything being geo-coded and viewable – a panopticon-style *uberveillance* of people and their affairs (indeed, many of the technologies and applications of Geographical Information Technologies were pioneered by the US military). But increasingly, critical scholars of GIS have moved away from outright rejection of such technologies to more nuanced understandings of the positionality of researchers and technologies in specific research agendas.

In our case, doing cultural research using Geographical Information Technologies means being wary of simply becoming government-sponsored “cool hunters” – doing the auditing and exploration work of government arts agencies and regional place promoters who want to know which people and places are creative or cutting-edge, in order to subsequently feature them in advertising campaigns or creative city place-making schemes (Christophers, 2007). Cultural prospecting on the behest of government was never our intention. In the examples discussed here we believe this has not been the outcome. If anything, usage of Geographical Information Technologies in creative city and cultural planning research projects has enabled challenges to accepted wisdom about what constitutes creativity, where it takes place and how it is embedded in the cultural vitality of cities and regions.

What matters most are the questions being asked, the assumptions being made, methods developed and how these extend critical or empowering research agendas. Our maps have not been used to solve policy problems or to definitively inform government decision making, but they have opened up dialogue beyond an increasingly predictable “script” of research and policy making on creativity (see Gibson & Kong, 2005) and inserted different ways of thinking (spatially, culturally, emotionally, affectively) into the realm of what stake holders beyond the academy consider “credible evidence”. An ethnographic epistemology committed to local nuance, subjectivity, complexity and cultural meaning has through GIS collided with another epistemology more about objectivism, managerialism and governmental agendas.

Whether our attempts to collide these epistemologies are plagued by an element of internal incoherency remains moot. An unresolved tension is between our “discovery” of subversive or heterotopic spaces of creativity in the city (underground music venues, illegal community gardens) and the edicts of cultural planning: how can researchers through Geographical Information Technologies advocate for recognition of the radical, the fringe, the community arts scene (frequently uncommercial) and reveal the spontaneous and organic aspects of their development, without unwittingly institutionalizing or non-liberalizing these activities? Against the risk of incoherencies between philosophy, method and outcome, we argue there are possibilities for counter-mapping knowledges, new data sources and new means of communicating research results to audiences, imagining alternative accounts of culture, fashioning research away from the dominant, masculinist, managerial character of GIS (Kwan, 2002). Critical is the promotion of geographical literacy: the imperative to see cultural trends as indelibly spatial; made real only ever in the context of ordinary lives, in nondescript suburbs as well as iconic buildings. Space is political and corrective (Dikeç, 2005) and Geographical Information Technologies provide one means to understand it – to conceptualize space in dynamic relation to culture.

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