FCJ-056 Cultural planning and Chaos Theory in Cyberspace: some notes on a Digital Cultural Atlas Project for Western Sydney

Posted By admin On December 4, 2006 @ 12:00 am In article,issue09 | No Comments

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A perennial issue for digital politics has been the debate between those who claim a liberatory role for digital technologies and those who see them as instruments for a more effective oppression. We prefer to avoid such abstract oppositions and ask more specific questions: what kind of digital technology, used in what way by whom, for what purposes in what contexts, may support the efforts of those who work for a better, more open society? To focus our enquiry we look at the intersection of digital systems and "planning". "Planning" in a general sense is a fundamental human activity in all societies exercising the "rationality" that has come to define humanity since the ancient Greeks. Yet the dominant form of planning in western societies today employs a specific form of 'rationality' which has emerged only recently, labelled 'Occidental rationalism' by Weber (1930:26), which insists on crisp, clear categories and a linear, reductive logic. Starting with Weber himself there has been a continuous tradition of critique of this form of reason, which we will categorize as linear reasoning.

In spite of the many inconvenient or worse consequences of this form of rationality as applied to human societies, it has maintained an unassailable position because it has been seen as inseparable from science, which has been presented as based on the same principles of rationality. Digital technologies have developed within science, and naturally incorporated these principles of reason in their conceptual foundations. This gives a special value in this context to what have been called chaos and complexity theories. These also developed within science, yet contain a highly developed, fully scientific alternative to linear rationality (see e.g. Law, 2004). These theories allow us to take full cognisance of the fluid, dynamic, turbulent situations which constantly challenge the reductive linearity of modern planning. They also allow us to re-think the possibilities for digital technologies in non-linear planning processes, going beyond the unholy alliance of linear digital technologies and linear planning.

By non-linearity we mean that what we are dealing with is a sequence of states at different points in time which are not characterisable in terms of linear causal relationships. Instead they manifest a variety of complex, reciprocal relationships and feedback loops. In mathematics, a system is understood to be linear if there is a constant proportional relationship between changes in one quantity and those in another. By contrast, behaviour within a non-linear system cannot be reduced to the sum of its parts. While the equations describing such systems can sometimes be solved straightforwardly, making precise prediction within the system possible, this is generally not the case. It may be possible to make do with linear approximation and extrapolation (the traditional planning approach), but such simplifications inevitably break down over sometimes quite short time-frames. We are not proposing that it is desirable or even possible to model mathematically the dynamics of cultural relations within the geographical region we are interested in to the degree which would make a formal planning "system" operational. What we hope to achieve here is to demonstrate that we can gain insights from domains of non-linear dynamics where more formal methods have proved to have some traction on problems of prediction and control.

In this spirit we want to explore issues and possibilities for digital technologies to assist in a kind of revolution in one particular place, the spot on the planet where the two authors currently live, Western Sydney. Western Sydney, like similar regions, is "chaotic", highly complex and unpredictable, incomprehensible without reference to multiple regional and global articulations, constituted by countless internal networks, actual and virtual, which give it a distinctive footprint in cyberspace itself. Our aim is not simply to describe this situation but also to dream: dreams that are shaped by this particular place and time, however much they also aspire to transcend them. (See Lally and Lee-Shoy, 2006 for an elaboration of this argument that the 'postsuburban' conditions of Western Sydney require a multiscalar and network-oriented response.)

Within the planning regimes of local government we focus on 'cultural planning'. Cultural planning is ambiguously related to the broader enterprise of planning in New South

Wales. It tends to be big on beautiful ideas and small in budget. Cultural planners as a profession show admirable levels of idealism, dedication and creativity on modest salaries with meagre resources, striving to benefit their communities.

We hope to find new uses of new technologies to help to enfranchise this valuable class of people and their communities as digital citizens. This is also a useful site for chaos-inspired interventions. In practice, cultural planning acts as a residual category to contain all the issues left over from linear planning. If it were less isolated from information resources, it might play an urgently needed role in re-framing the planning process itself, to cope better with what Law (2004) calls the 'mess' of social life.

Digital Utopias as Planning

Discourses of digitality are prone to euphoric, utopian claims about the brave new world just around the corner or almost already here (see e.g. Negroponte, 1996; Gates, 1999). So is Big Planning. Both use linear thinking to project a small number of features isolated in the present into a simplified future constructed in their terms. Digital prophets have as bad a record at prediction as Big Planners. But prediction is not the only intellectual use of utopias. Thomas More invented the word in the 16th century to project an ideal country to critique his own (1556/1999). Every utopia has this double face, both plan and critique, apparently looking to a future which normally never comes, yet also encoding critiques and guidelines for change. It is in this combination of prediction and critique that we can begin to find more complex approaches to digital planning. The complexity we are referring to tends to shift things from the linear to the non-linear. Although the projection may seem linear in the utopias involved, non-linearity often lurks in the critiques or dreams.

This complexity can be seen even in the countless digital mini-utopias constructed by IT advertisements. We illustrate with a typical example, a 2005 advertisement for Microsoft Office. The picture shows an office with paper everywhere on a desk. An old-style computer print-out runs onto the floor. Two men sit with dinosaur heads stuck onto their bodies, one with arms crossed, the other holding his head in frustration, both in evident despair. A brightly coloured third dinosaur brings a pile of paper to one despondent dinosaur, like a female secretary. The heading says: 'The I CAN'T DEAL WITH ALL THIS DATA era is over'. These dinosaurs are then challenged:

> Microsoft® Office has evolved. Have you? Is information overload a daily challenge for you and your team? Today's Microsoft Office has improved screen layouts, time-saving features and email management tools to help you better manage your workload… It's time to evolve the way you work. Discover how at Microsoft.com.au/office. (Daily Telegraph May 24, 2005:16)

The intended point is that the latest version of Microsoft Office supersedes all previous versions, but this point is complicated by the way the text uses the grand trope of evolution, with digitality the marker of progress. This supposed process plays itself out on different scales, producing complex and contradictory concepts of evolution, which give different takes on digitality. At the largest scale is the evolution of species, from dinosaurs to humans in one mighty leap. This mirrors an implicit progression, from the pre-digital era to the digital office, and now an evolution within the digital era which is the focus of the advertisement.

In this two-stage progression, stage 1 of digital evolution saw computers producing two kinds of problem: failures at the interface with human users, and excessive data. The productivity which seemed digital technology's evolutionary edge over print turned out to produce unexpected problems. Chaos and disorder were paradoxical products of this symbol of order, desk top computers and office software. By stage 2, human users have reclaimed control, thanks to the latest Microsoft Office, though the claims are modest and evolutionary. 'Improved' screen layouts help to 'better' manage workloads. This is not a new concept and certainly not a new brand. This utopian vision of an office saved by Microsoft is carried through images of its opposite, the frustrations of digitality as experienced by the current generation of users. This critique of the limitations of linear systems (of the past) comes not from an anti-digital Luddite but from a major digital player.

Similar complexities can be seen in more academic proposals for a digital utopia. Pierre Lévy also uses the evolution trope as he proclaims a new stage in humanity associated with digital culture:

> The development of digitally controlled cognitive prostheses is transforming our intellectual capabilities as clearly as the mutations of our genetic

> heritage. The new technologies of communication through virtual worlds have altered the formulation of the problem of the social bond. In short, hominization, the process of the emergence of the human species, is not over. In fact it seems to be accelerating. (1998:xxiv)

Lévy's vision seems simple and positive, but some ambiguities lie in wait under his words. 'Digitally controlled' sounds fine, but who is doing the controlling? In a stage-1 Microsoft Office office, workers wonder whether they are controlling the 'prostheses' or are being controlled through them, whether digitality itself to some extent controls them both. These bewildered workers have their capabilities transformed, but not enhanced, even according to Microsoft. In stage 1 of the digital, the 'social bond' is rendered problematic by this technology, with only the female dinosaur performing her traditional gendered role, untouched by evolution or distress. The linear acceleration Lévy claims in the rate of hominization is complicated by an uncoordinated rate of change in the technology that passes from one "era" to the next in a decade. If linear thinking in the past produced unexpected complexity, what guarantee does Lévy have that it will not do so in his future?

However, Lévy's vision, as utopian possibility, with its design features in a blueprint for the future, again carries a critique of the present as much as a proposal for the future. He calls the utopian possibility 'collective intelligence', a capacity for individuals to share in the production and use of knowledge on a greater scale than has been possible before.

> First, we will have at our disposal simple and practical means for knowing what we are doing as a group. Second, we will be able to manipulate, much more easily than we are able to write, the instruments for collective utterance. (1998:xxviii)

His language here as elsewhere moves ambiguously between prophecy and proposal. What interests us here is the implicit critique of the past and the limited parameters – tending towards multiple forms of exclusion – it specifies for future designs. His 'we' may be problematic, but here it is grounded in the 'group' constituted by this broad and complex collective act of knowing, which Lévy insists should be as inclusive as possible. For these purposes, the vagueness involved is productive. The means for knowing must be 'simple' and 'practical', but this is precisely because the world to be known and the social structures of the knowers have become more complex.

There is a paradox here so crucial that instead of trying to eliminate it (as linear rationality would dictate) we propose to include it in our basic design specifications. 'Simple' means for knowing must at the same time recognize and do justice in a 'practical' way to the extreme complexity facing those who seek to plan and act intelligently in the world today.

The Microsoft ad seems to be about computer systems, but also carries surprising messages about digitality and planning on the micro-scale, the dangers of mere linearity and the need for these systems to be set in a more complex framework, in order to deliver the claimed simplicity. Lévy's vision is poor prophecy but invaluable in setting goals for developments in digital technologies and uses, as they serve multiple human purposes in a complex, chaotic world. That is how we intend to use his ideas in our own more practical project, to adapt existing digital technologies to serve the needs of a single complex community.

Planning and Digitality in a Complex World

So far we have referred to chaos and complexity in everyday terms, as self-evident properties of the modern world which is the object of planning, mediated and acted on by digital systems. It is time to clarify how our approach to digital planning relates to Chaos Theory more specifically. Chaos Theory is used in a wide range of sciences, and has been widely expounded in popular science (see e.g. Gleick, 1988; Hall, 1992), with some attempts to use it within the social sciences (Hayles, 1990; Guattari, 1995; Gates, 1999; Coronado and Hodge, 2004). "Complexity", a complementary term for a heterogenous set of ideas related to Chaos Theory, has also proved popular (see especially Thrift, 1999; Urry, 2003; Couldry, 2000; Law and Mol, 2002). But in the social sciences the deployment of Chaos Theory and "complexity" remains problematic. There is no orthodoxy to refer to, no consensus to fall back on.

As a symptomatic instance, Lévy is aware of Chaos Theory, but sees it as a parallel development in science, not a body of theory that is at the heart of understanding his new world and its new forms of knowledge, its new species.

> The deterministic chaos and fractal objects studied by the natural sciences

> echo the fads, erratic behaviour and randomness that now characterize the human world. (1998:199)

In footnotes he refers to the ideas of Prigogine, Lorenz and Mandelbrot, which provide a good starting point for our own brief inventory of concepts and analytic tools to apply to digitality, to the subjects and objects of the technology and to the planning process. We are not suggesting here that it is only the precise methodologies (the mathematics for example) drawn from these ideas that are useful to digital planning (although they might be). Rather we draw, sometimes loosely, sometimes more precisely, on the principles involved in order to bring some significant innovations to cultural planning.

Chaos theory implies an ontology in which the world is characterised by significant non-linear complexity. This makes the principles behind Chaos theory very useful within the contemporary social world. Here there is a wide-spread sense that levels of complexity today are rising in every aspect of the contemporary world, in the social sphere and in the semiosphere of circulating meanings, affecting and affected by events in cyberspace. Practices derived from the principles of Chaos theory can therefore provide significant re-orientations to the way planning is understood and carried out. Such practices can perhaps begin to answer some of the dilemmas of planning, recognised before the development of Chaos theory. For example, Ashby's famous Law of Requisite Variety (1961) is a salutary check on linear utopian projects: a control system must have the same 'variety' as the system being controlled. Given that a plan is a mechanism of control, this implies that its supporting information system must incorporate the variety of what is being controlled, a diverse society. This variety minimally encompasses the three main elements that make up the planning process: planners, the world they plan for, and the technologies they use to understand and manage it.

In this spirit we will introduce a brief tool-kit of concepts drawn and adapted from theories of chaos and complexity which we have found especially useful in thinking about key issues of planning and digital systems.

1. Far-from-equilibrium dynamics. Here the key theorist is Ilya Prigogine, (Prigogine and Stengers, 1984) who proposes that natural systems (including social and biological systems) exist in three fundamentally different conditions, which have very different properties. Systems at or close to equilibrium have simple structures, little or no movement, and are highly predictable. Chaotic "systems" are so random that they are barely systems, though they still have typical behaviours. Between these two extremes are systems which are far from equilibrium but at the edge of chaos, not beyond. Systems in these conditions are typically non-linear, and cannot be precisely described or predicted. Causes can have disproportionate effects, and they can act over surprising distances.

One phenomenon which illustrates far-from-equilibrium properties well is the so-called 'butterfly effect' proposed by Edward Lorenz (1995). According to the metaphor, the flapping of a butterfly's wings in the Andes may "cause" (or more precisely, introduce a tendency in a chaotic system whose outcome is) a hurricane in Beijing. The point of the metaphor is not that Andean butterflies should all be exterminated before they do more damage. It is that in a chaotic situation, it is not clear till after the event just what might prove a decisive input, or what its effects might be.

There are two major implications for planning and digitality. If Prigogine is right, then the further from equilibrium a situation is, the more inadequate linear planning will be, especially over time. The extrapolations common to Big Planning and digital utopianism will be increasingly misleading. "Butterfly effects'" will defy the predictions of linear planning. Yet they are not alien to computers. On the contrary, they were first identified through computer modelling.

However, Chaos Theory also offers a framework for more positive and constructive responses to chaos. Prigogine is not pessimistic about far-from-equilibrium conditions. He claims that all complex forms in sociology and biology emerge in far-from-equilibrium conditions (Prigogine and Stengers, 1984: 13-14, 312). Close-to-equilibrium forms are easy to predict because they are so limited in scope and complexity. Far-from-equilibrium forms can be richer and more functional than any reality projected by linear logic. They can also be planned for, using a non-linear logic and a non-linear form of planning, based on a non-linear analysis of non-linear data. Digital systems, suitably adapted, can contribute to this kind of process. Although, because non-linear events are not predictable in the same way as linear events, this significantly shifts our understanding of the forms and assumptions of planning as a cultural process.

2. Fuzzy logic. Contradiction and indeterminacy are two basic features of complex, far-from-equilibrium systems. The engineer Lotfi Zadeh devised a new kind of logic to deal

with situations which could not be resolved by classic Aristotelian (binary) logic. Fuzzy logic is designed to deal with contradictions, where an element may be classified as both A (in some respect or to some degree) and not-A. Paradoxically, in the hands of engineers this logic leads to better control systems, not less capable ones, and the same is true of planning. Computers programmed with fuzzy logic can perform complex tasks better than with linear logic (Kosko, 1984: 38-39). Zadeh connected his account of fuzziness with an idea paralleling Prigogine's, that different rules apply under different conditions of equilibrium:

> As the complexity of a system increases, our ability to make precise and yet significant statements about its behaviour diminishes until a threshold is reached beyond which precision and significance (or relevance) become almost mutually exclusive characteristics. (1973: 28)

In other words, there are unavoidable trade-offs between the precision with which we can describe the planning context and the relative significance attributed to the various components of that description. This observation has direct implications for planning in complex situations, and for the form in which data must be encoded to support it.

3. Complex, dynamic change. Another characteristic of the situation planners now face is greater dynamism. Change is faster and less predictable than the simplifying assumptions of linear planning can take account of. Tsoukas and Chia (2002) argue that traditional approaches to organizational change have privileged stability, routine, and order. Structuralist epistemologies, they suggest, have a blind spot about change, and as a result, change has been treated as exceptional rather than inevitable:

> It is now realized, across scientific fields, that we are lacking the vocabulary to meaningfully talk about change as if change mattered–that is to treat change not as an epiphenomenon, as a mere curiosity or exception, but to acknowledge its centrality in the constitution of socio-economic life (2002: 569).

This reasoning can be illustrated through the example of Saussure, writing about the relation between "synchronic" (same time) and "diachronic" (across time) structures. In a famous argument he claimed that 'never is the system modified directly. In itself it is unchangeable' (1917/74:84). That is, change happens all the time, but never synchronically, 'in language', only from a point of view outside language, in diachrony. Linguistic and other systemic forms of change cannot be studied by structuralist methods

Saussure recognised this as a dilemma for structuralism, a problem he bequeathed to later structuralists. In 1926, in a different field, Werner Heisenberg both recognized and pointed to a resolution of this dilemma, in his 'Uncertainty principle'. This mathematically demonstrated, for conditions at the quantum level, that 'it is not possible to describe both momentum and position of a particle at the same time, with a given degree of precision' (1989). Scientists typically limit the application of this principle to the processes of measurement within the quantum world. However, the principle may have a wider application. Ilya Prigogine (Prigogine and Stengers,1984:222-4) has famously suggested that Heisenberg's proof applies to all cases where two dimensions can be shown to be interdependent. This happens often under far-from-equilibrium conditions, when change of position is rapid, and direction and momentum are unpredictable. The case of Saussure illustrates how widely applicable the principle is. By making synchrony and diachrony radically interdependent he was bound to find it impossible to be equally precise about diachronic and synchronic facts, though linguistic change demonstrably happens in everyday space and time.

Applying the principle derived from Heisenberg to planning, we can conclude that whenever structures and change processes are radically interdependent, as they typically are in complex conditions, there is an unavoidable trade-off between the precision with which the current state of things and their rate and direction of change can be described. The paradox is that, traditionally, both must be described for planning to be effective. In practice, this means that some degree of fuzziness in interdependent dimensions is essential to an effective planning process.

4. Against binaries. Binaries play an ambiguous role in digital thinking in relation to planning. On the one hand basic digital code is binary, yet the power of computers can create highly complex structures out of these basic binary forms, in which simple binary forms can no longer be recognized. At the same time, the binaries that shape so much planning do not come from digital binaries but from pre-digital traditions. As Derrida (1976) amongst others has shown, potent binaries have their roots in a past which more often than not pre-dates the digital. Threeness has a venerable history of disrupting this common dualism. A proposal within Chaos Theory that can help to counter dualism comes

from work of the French mathematician Henri Poincaré on what he called 'three body systems' (1943). Poincaré demonstrated that a system of three bodies in an interdependent system (he had in mind the sun, the earth and the moon) is inherently unpredictable, so that over infinitely many repetitions the system never settles down to a stable, predictable state. A lesson from Poincaré is that as soon as more than two complex, inter-related but independent factors come into consideration, precise prediction becomes impossible. This principle can be applied in the design of planning information systems, to guard against falling into the trap of binaristic linear thinking, by forcing the consideration of the interplay between at least three independent but inter-related dimensions of whatever problem is under consideration.

5. Scales and fractals. The issue of scale constantly confronts planners, who typically find it difficult to cope adequately with a reality which exists on many scales simultaneously, where sometimes structures on the largest scale seem to influence all others, but where those influences constantly meet and interact with structures and events on lower levels, any of which can spawn unexpected "butterfly effects". In the planning domain, the co-existence and interaction of policies and programs at different levels of government – international, national, state, regional and local at least – illustrates the difficulty. Similarly, planning processes are inherently political, and governments can change overnight. The often hotly contested interaction of issues and priorities at different levels of scale, from the global down to the neighbourhood, can offer seemingly intractable challenges to planning in geographically localised domains.

The mathematician Benoit Mandelbrot's fractals (1992) provide a powerful model for certain kinds of multi-scalar processes. Although multi-scalability is not always, strictly speaking, fractal, there is still much to be learnt in principle from Mandelbrot. Mandelbrot's version of fractals existed first in mathematical space, and then on computer screens, but they have been seen to have many real-world applications. Fractals are 'self-similar', usually irregular shapes reproduced at different scales in a manner that can be analysed mathematically.

Fractals – at least the general principle involved, in that although there are always important relations between different scales, these do not always involve self-similarity – can be used to provide a richer understanding of strategies of zooming across different levels. Zadeh has suggested that fuzziness is itself produced by movement across scales, requiring what he calls granularity of description (optimum precision for a given structural level). Fractals at more than one level above or below a given level may be only perceivable fuzzily. Within the domain of information architecture, the concept of "granularity" is used in a similar way, to denote the way that digital objects are often nested (files within folders, for example) (Hagedorn 2000: 4). In describing the development of a classification scheme to make the work of nurses more visible, Bowker and Star (1999) illustrate how hierarchical classification schemes or thesauri, as socially constructed informational structures, must negotiate the sometimes difficult politics of clarification and ambiguity at different levels of granularity.

Heisenberg's uncertainty principle suggests that the seductive clarity and beauty of a single fractal (computer-generated examples of which have become hugely popular) may be less illuminating than fractal momentum, a trajectory through different levels of fractality. Applied to planning, the articulation between levels may be impossible to describe with the same precision as that with which discrete levels are able to be described. Yet these relational characteristics remain critically important. For instance, Lévy's description is at the global macro-level. For planning purposes we need descriptions at intermediate levels that finally make contact with virtual communities formed around local sites, not only comparisons, but also a dynamic picture of possible movements across them.

Cultural Planning in the Greater West

The region we are interested in, Greater Western Sydney (GWS) in New South Wales, Australia, illustrates many of the issues and problems facing cultural planners in the global world today. From some points of view this region is well placed in terms of cultural planning. The NSW Government's Strategy for the Arts in Western Sydney, released in November 1999, required Councils to undertake cultural planning as a precondition for participation in its funding schemes, providing a major impetus for cultural planning. Of the 14 Local Government Authorities (LGAs) making up the GWS region, over half already have a cultural plan in place, with the remainder either developing or intending to develop one. In 2004, after extensive consultation, this government issued its Cultural Planning Guidelines for local government. These are plans for the planners, emanating from above, though implementation is primarily the responsibility of lower levels of government.

This planning process is good of its kind, but that kind is inevitably linear, producing a utopian vision of a planning process. Yet the "Greater West" has many characteristic structures and processes of a far-from-equilibrium situation. The region for many years was neglected by planners, or viewed through negative, inappropriate stereotypes, a crisp logic imposed from outside and above, unable to see the forms of community that emerged over time. It is divided into Local Government Authorities, (LGAs), 14 boxes, each with a crisp boundary around it, in spite of the fact that rivers, roads and communication systems ceaselessly cross all these boundaries, bearing people and things, images and ideas throughout the region, connecting with other regions and the rest of the world. The functional reality of the region is already a network of networks in constant process of forming, not the static, autonomous entities shown on maps which form the basis of the planning function. Not all these networks are fully represented in cyberspace, but the forms of cyberspace already correspond better to a set of forces and ways of understanding social forms and processes than any older, more static map of LGAs and their boundaries. In this respect, Lévy's vision of a digitally-formed territory which is both a knowledge space and a complex social form is already emerging.

The Australian economy has opened up, increasingly integrated into the "global" market, accompanied by changes that impact on communities and people at many levels, needing a dynamic, multi-scalar map, with fractal theories as a guide. The fortunes of Sydney, as Australia's "global gateway", have surged, and with them tensions in the relation between the CBD and the West, and potential costs or opportunities of this expansion. Western Sydney has the fastest population growth in the state. Not only does infrastructure and service provision (including cultural infrastructure and services) need to keep pace with this rate of growth, but the planning environment has become especially volatile and unpredictable, putting a far higher demand on information sources, requiring new strategies for making forecasts, predictions and interventions. In popular terms, Western Sydney is 'hot': some parts hotter than others. There are many markers that this is a far-from-equilibrium situation, where planning must expect the unexpected.

Home to a diverse population of around 1.85 million people (over 42% of the Sydney metropolitan population), the "Greater West" is now the third largest economy in Australia (DSRD nd). Linear planning agendas developed from the top down are inherently inadequate to manage the development of such a complex, dynamic region, or even to understand fully what has happened. There is an especially acute need to encourage the flow of ideas and initiatives vertically as well as horizontally in and for the region. Without tapping creativity and knowledge from below, the region will be unable to realise the positive potentials within the inevitable transformations accompanying continued strong population growth and the need for urban consolidation.

Over the past 10 years, cultural planning has increasingly featured in local government planning in New South Wales, but it still plays an ambivalent role. It is both enabled and constrained by an ambiguity in the key term 'culture', which is then framed by more or less linear understandings of social processes. Previously 'culture' had a relatively crisp meaning, referring to the arts, seen as a minority sector of community activities, mainly viewed through the lenses of an elitist conception of the nature and role of Art. It was seen in a linear, top-down way, as a good thing which should benefit the ignorant populace.

In cultural planning's "new era", this understanding of "culture" co-exists with "culture" as defined far more fuzzily, as something more complex and amorphous, pervasive and inclusive, the meeting point for various forces and interests from below ("the community") as well as from above. This is "culture" as a non-linear formation, which allows "cultural planning" to address some of the planning needs for the complex, non-linear problems of regions like Western Sydney. The NSW Cultural Planning Guidelines for Local Government, issued in 2004 in a glossy booklet, is a manifesto for this concept of culture. It emphasises the scope of cultural planning as being 'culture in its widest sense', that is, as 'about what matters to people and communities' (2004:7). This definition gives cultural planning a broad brief: it is 'a strategic process which illuminates and gives significance to both the material and values dimensions of culture in a community, in a way which informs a council's thinking, policies and programs'. In this form, cultural planning seems a potential major player in local government planning processes:

> When harnessed to local government's strategic objectives, cultural planning can help councils tackle social exclusion, contribute to urban regeneration, create employment opportunities, build safer communities, improve community well being, and encourage healthier lifestyles. (2004:7)

This discourse is as utopian as Lévy's, admirably complex in its scope. It reminds us of fractals in that it mentions four strongly related levels of scale, from the NSW State

Government through local government authorities, their cultural planners and communities, and includes more than three dimensions, society, urban environments, employment and health. But for this vision to engage with the far greater complexity of the many problems of the many communities and integrate cultural factors into broader planning processes, it needs explicit mechanisms of articulation, and rich, accurate, comprehensive, user-friendly information about cultural, social and economic resources across this region. Otherwise, the promise of inclusiveness, complexity and responsiveness to communities will remain mere rhetoric.

Cultural planners have a significant place in developing and implementing cultural plans in New South Wales, but outside that narrow domain their role is limited. We illustrate with the employment process for cultural planning, using a 2004 advertisement for a Cultural Planner by one of the larger councils in Western Sydney. '[X] City Council is seeking an enthusiastic and highly motivated professional to develop a city wide Cultural Plan.' The successful candidate will put together a Cultural Plan, following the NSW Guidelines. The position is offered at Band 3, level 2, Grade 2, $AUD934.20 per week ($US700.00). It is a contract position, for 18 months. Applicants are assured that 'flexible work arrangements would be considered for the right applicant'.

This flexibility is typical of the conditions of 'precarious labour' in the New Economy. These terms contrast with the requirements of the plan that is to be produced, which should cover 3 to 5 years. The selection criteria consist of 7 points, most with further dot points. The first 6 criteria create a picture of the desirable attributes of the Cultural Planner: high level communication skills, project management skills, negotiation and consultation skills, high level skill in Cultural Planning, and ability to work in a team environment. Item 7 in the skill set is 'Demonstrated computer skills'. It has two dot points: 'Experience in a range of office software, particularly Word', and 'Demonstrated competency in email systems'.

This last item is a signal, especially revealing because so unconscious, of the low value attributed to digital skills and resources for this position. A "Microsoft Office dinosaur" would be well-qualified for this job. X Council is not out of step, here. The NSW planning guidelines make no mention of databases. The emphasis is on "consultation", using the old technologies of speech and writing to gather up some more subjective data. These are indeed important for a planning process that reflects and responds to the complex needs of a diverse community: important, if the planners are able truly to take them into account.

This creates a paradoxical situation for Cultural Planners. The "soft" data they can provide are largely missing from the data sets familiar to urban and land use planners who run programs at state and local levels. Yet in terms of the dominant (linear, crisp) mind-set in the planning community, "soft" data does not rate strongly compared to "hard" data. Figures on social and economic data are now available electronically through the Australian Bureau of Statistics (ABS) and other sources. Many of these are collected in linear, crisp categories, and give only one dimension of the issues, well-adapted to linear decision processes. However, there is already an increasing awareness of the value of "softer", less linear data. The ABS is developing statistics around such fuzzy concepts as "social capital", broken down into some general categories such as gender, class and ethnicity, and even place. At the same time, social, environmental and land use planners, in Councils and Government, have access to all the hard data, but do not find it easy to integrate it with "soft" data, whether what is currently available or what they would need to collect themselves. Working at higher levels of geographical scale and social aggregation, they do not attach great value to planners working at more fine-grained and spatially differentiated levels, like our Council Cultural Planner, who would have a better feel for the picture created by the "soft" data. Neither kind of planner alone can plan across the complex intersecting levels and strands that "new era" cultural planning demands, and already proclaims itself able to manage.

The Cultural Planning utopia of the NSW government can be interwoven with something like Lévy's digital utopia, expanding the scope of information and the scale and complexity of the virtual community of planners and communities in each locality. Two utopias in this case may be better than one, or none. A third utopia might be even better, especially if all three were used as the basis for critiquing the present, and mobilizing for the future.

Towards a Digital Cultural Atlas for a Chaotic World

Our own utopian project starts from one piece of digital technology, Geographical Information Systems (GIS), using some ideas from Chaos and Complexity to push this technology to be more adequate to the demands of cultural and general urban planning for the Greater West. The exemplary user we have in mind is a cultural planner

for the Greater West. The exemplary user we have in mind is a cultural planner, networked with other planners and with others in the vast, far-from-equilibrium community they relate to. We wish to explore options which exist virtually for such a class of persons, assuming only a realistic level of skill, and access to computer technologies and the resources of the Net.

GIS is currently capable of representing information about the Sydney region according to a spatial grid, in the form of a map. Many planning systems in local government (apart from cultural planning) rely heavily on these tools for spatially representing the matter they deal with. This visual form is a great advantage of this technology, making information available to users in a rich, human semiotic mode. It allows zooming from the regional level to the level of particular buildings or streets, if these can be located in the base maps, plus any other kind of data that has been coded for location. The typical GIS interface organises information in different layers. Layers can be readily added, and can be switched on and off to avoid confusing the user with data overload. Layers may be grouped into themes, enabling related data to be viewed together without compromising legibility due to screen clutter. All these capabilities are consistent with Lévy's criterion, that complex information should be communicated in ways that are 'simple' and 'practical' (for humans not yet fully 'hominized').

We are currently undertaking an Australian Research Council Linkage-funded project to construct a GIS-based information system for cultural planning which builds on these capabilities for spatial representation, but goes beyond them in ways that make the complexity and dynamism of local communities visible and tractable for planning purposes. Our "digital cultural atlas" builds on the traditional idea of an atlas as a series of maps, often giving multiple images of the same spatial domain, along with related information on economics, politics, demography, and indexed to allow ease of access to information. The digital cultural atlas extends on this traditional model, however, in translating the mapping capability to the digital domain of GIS, incorporating powerful search and indexing modes, and linking to networked information (both spatial and a-spatial, including the wider resources of the Internet).

In contrast to the traditional GIS with its 'bird's-eye" top-down view, our interface design incorporates multiple panes, capable of representing both quantitative and qualitative data, accessible via an information architecture encompassing both spatial and semantic modes, so that different but related data sources and formats can be present simultaneously. Hyperlinks connect GIS-accessible data to other online sources, including text and non-text digital objects from anywhere in the world via the global reach of the Internet. The global and local can thus weave together on any scale, responding to the intelligent interest of the searcher, whether cultural planners or those they seek to communicate and collaborate with. This is "manipulation" in Lévy's sense, in which the difference between reading and writing is functionally blurred, as reading processes immediately produce text, and traces of their own processes which can also be communicated to others.

The ideas derived from Chaos Theory we described earlier have been applied to the process of framing and designing the system's information architecture and user interface.

Heisenberg's Uncertainty Principle and Far from Equilibrium theory frames the use of these systems. GIS maps are synchronic, giving physical reality at a given moment in time. In itself GIS is inherently ill-equipped to represent change. As a planning instrument this is a crucial limitation, since plans deal with a dynamic world which has already changed and will change even more over the lifetime of the plan. The GIS is best at showing only what cannot be planned, only what has to be planned around. Yet change happens unevenly on different scales, and it is valid to include information about things which change only slowly as though they do not change at all.

Even though change is difficult to display in itself, it can be represented through animation or other signifiers of movement, which can help planners even when fuzzy and simplistic. A sequence of maps, for example, can show the evolving spatial distribution of population over time, or the changing locations and service catchments of cultural institutions and other cultural infrastructures.

In a correlate to Heisenberg's principle, we recognise that it is inherently impossible to represent time and change, with any degree of complexity, in a synchronic map. It can, however, be done fuzzily through representing at least two systems, each fuzzily readable alongside the other. Demographic data is available in readily mappable form via the Australian Bureau of Statistics. The 5-yearly census collection, for example, provides a spatially fine-grained and thematically comprehensive diachronic overview. Comparison between variables is difficult, however, once more than two or three variables are involved, as a glance at the tabular format in which the ABS generally publishes its data will attest. A more sophisticated understanding of the complex composition of local

will attest. A more sophisticated understanding of the complex composition of local communities can be gained by allowing the user to move readily between multiple and/or composite views of different variables for the same area, such as different dimensions of cultural diversity (place of birth, language spoken, religion) and their interaction with socio-economic variables such as income and educational attainment. Similarly, the same variables at different points in time can be juxtaposed by showing them in different panes of the same screen, or animating a sequence of them.

Another productive source of fuzziness is within the classification schemes of the information architecture itself. In the discussion of granularity above it was suggested that as system-builders we need to be mindful of the political dimensions of information architecture. As Mitch Kapor has recently written, architecture is politics (2006). The recent proliferation of social networking sites such as CiteULike, YouTube, MySpace, Flickr and many others gives a strong indication of the power of "tagging", or community-generated classifications (also known as 'folksonomies') (Hammond et al, 2005). Within our project, we aim over time to complement a formal categorisation structure which articulates with standards-based classification systems (such as those used by the ABS) by implementing functionality which allows users to tag or annotate resources themselves. In this way, the fuzziness of naturally proliferating and idiosyncratic user-generated semantic categories and terminologies can enrich the system and provide a mode of resistance to the homogenising and hegemonising tendencies of digital linearity.

Three body analysis suggests that it is productive to organize bodies of data into broad themes, to avoid binaries or one-sidedness. A single-variable map is attractive to planners precisely for the reason that it is likely to be misleading, momentarily removing the multiplicity of factors that drives every complex real-life system. A single map can represent different aspects of physical space in a single frame (e.g. buildings, roads, parks and natural features), but planning also requires an ability to represent and manipulate the complex, undecidable interactions between different orders of reality.

With this in mind, our database is organised in terms of three broad categories or modes, all of which we understand as interdependent and crucial to any planning process or decision: the socio-economic, the cultural, and the subjective, against the background of the spatial. The socio-economic mode includes harder and softer data (demographic data, economic statistics etc.). The cultural mode includes a range of resources throughout the region, covering by the broader sense of the term, and also its artistic forms. This kind of information is relatively easy to collect and assemble, since councils maintain directories of community resources and relevant databases such as catalogues of public art or heritage collections. The subjective mode gives access to a multiplicity of diverse voices and perspectives, available as video or audio streams, in transcripts, or in other digital forms. This is the kind of information that is most often invisible in planning, because it is hard to collect and manage and in the past has been hard to integrate into planning processes. A rich source of this kind of information, however, can be accessed through working with the materials captured by cultural development organisations working in close collaboration with diverse local communities. Western Sydney hosts many such organisations, one of which is Information and Cultural Exchange (ICE). This community-based new media organisation, working with a range of emerging, refugee and minority communities, is one of our partners in the digital cultural atlas project, and is providing a model for knowledge transfer of the accumulated cultural intelligence the organisation has generated over several years, as we evaluate and selectively digitise their archival materials. In order to make these levels of complexity available to direct perception by cultural planners, a single screen contains panes providing representations in these three modes.

Principles similar to fractality in the multiscalar landscape can be incorporated and made perceptible for planning and cultural development purposes through the GIS's support for zooming in and out. A zoom juxtaposes images at different scales, and can generate a loosely defined kind of fractality. Here the "fractals" are patterns in the structures of cultural relations within the region represented, more or less replicated at different levels (vertical fractals) or the same level (horizontal fractals). For example, by mapping the networks of the many collaborative partnerships and projects between Western Sydney's cultural organisations, the interactions and relationships between these "cultural mode" resources can be demonstrated to have similar structures at different levels of geographical scale, from the region-wide catchments of the major cultural institutions to the locally-dense networks of organisations working within a single LGA. Similarly, and productively from the point of view of advocacy and planning, at each level of scale these "cultural mode" network structures can be shown to be reflected in the richer qualitative structures of the subjective mode, by demonstrating how the collaborations have built shared cultural development knowledges and methodologies.

Available technology to add spatial coding to diverse data sources is fairly intuitive to use. A PDA or similar device which allows spatial location data to be collected via GPS and

linked to other information are now relatively inexpensive (around AUD$1000), and allows metadata and annotations to be collected by a roving cultural development worker. As an adjunct to the cultural atlas infrastructure, we are currently implementing a mobile digital multimedia infrastructure which will allow for custom data collection, incorporating audio-texts and still or video images from community members and organisations into the GIS database on an ongoing basis.

Conclusion

This article may seem caught in the same contradictions as it critiques. We try to plan an instrument for planning, in an environment we claim is non-linear and inherently unpredictable. We want to use digital technologies, in spite of being aware of the systemic gaps between digital promise and accomplishment. But these contradictions are only problematic in terms of a crisp, binary logic. The problem we see is not with planning or digitality as such, but the taken-for-granted linearity of current planning and digital paradigms. So we do not offer a single grand plan for a Digital Revolution or a new planning millennium. On the contrary, our propositions are highly local, looking at planning issues and digital resources in a specific site. The process we propose involves participation at every step, with different groups and interests, all of whom we value. We see it as essential to incorporate the fears, desires and aspirations of many groups within a large, diverse region, irrespective of whether or not they see themselves, now or in the future, as members of a single virtual community. We work with a dialectic between "planning" processes which already exist but could be different, and technologies which likewise already exist but which equally could function very differently.

We do not know what this complex virtual community might look like. Nor do we know whether it can acquire the 'collective intelligence' Lévy talks of, in any practical way. Nor do we know what new forms and uses of technology might be driven by the evolving needs of these new users. But we do not despair just because we cannot predict or control this future, these futures. One lesson of Chaos Theory is that no-one else can, either. The will to predict is always doomed and counter-productive. Life, whether social, cultural or digital, is inherently complex. The best planning and most effective digital systems will always reflect those two principles.

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Professor Bob Hodge has a distinguished international reputation and is widely published in the areas of social semiotics, cultural theory, postmodern studies, and Latin American studies. He has been a Fellow of the Academy of the Humanities since 2002, and was awarded a Centenary Medal for his contribution to the academic fields of communication and cultural studies.

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