GamePlan™: Serious Gaming for Place Making

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ABSTRACT

'Serious games' can represent complexity and engage people in complex and partially subjective problems and option selection. A concept prototype is emerging to manage, inform and support collaboration in Town Planning in relation to developing policies, regarding future city or street shapes, and judging insertions into existing spatio-physical environments. Whilst some of these tools are already available in a limited and specialised manner, such as standard 3D models, there is no open and inclusive tool to allow multiple clients to meet, experiment and shape the future of their area of concern online. In games, where you can meet in virtual worlds, spatio-physical environments are static whilst avatars and characters are highly dynamic – the inverse requirement for experimenting with future urban form. Can we get the planner to 'play' with the 3D world in a useful and meaningful manner? Can we then meet online and discuss possibilities for sites and districts and see our thoughts manifest in conceptual patterns. This is the theory behind the software. Utilising urban design patterns and planning codes from a global repository of city morphology will be the planning contribution, with the technology the contribution from the games industry.

Categories and Subject Descriptors

H.5 **INFORMATION INTERFACES AND PRESENTATION** (e.g. HCI) H.5.3 User Interfaces H.5.3 Group and Organisation Interfaces: http://www.acm.org/class/1998/

General Terms

Serious games. Place-making. Urban patterns.

Keywords

Urban design, town planning, wicked problems, spatial stories, gameworld, place, placemaking.

1. INTRODUCTION

'Serious Games' [1] increasingly pervade professional and/or training settings. They often facilitate structures to engage and develop multiple perspectives of knowledge. They also may provide environments in which to explore "***wicked problems***" [2]. Wicked problems have incomplete, contradictory, and changing requirements; and solutions to them are often difficult to recognize as such because of complex interdependencies. Many applications for development that go through the planning system are such problems as they have no 'right' or 'wrong' answer. Similarly, setting planning policy, such as deciding a rule for height or building setback, is 'wicked' in itself, as it has no ultimately correct answer. Rittel, the proponent of the 'wicked problem', was himself an urban planner and designer. Some of the typical characteristics that these problems involve, which are being supported through developing gaming software tools, include:

- Stakeholders have radically different world views and different frames for understanding the problem.
- Constraints and resources to solve the problem change over time.
- Wicked problems do not have an exhaustive set of potential solutions.
- Wicked problems are often "solved" through group efforts.
- Wicked problems require inventive/creative solutions.
- Every implemented solution to a wicked problem has consequences, and may cause additional problems.
- Wicked problems have no stopping rule(s).
- Solutions to wicked problems are not true-or-false, but instead better, worse, or good enough.
- There is no immediate and no ultimate test of a solution to a wicked problem.
- The planner or designer (solving the problem) has no inherent right to solve the problem, and no permission to make mistakes.

Due to the wicked nature of town planning, in this regard, and the increasing focus on community consultation, involving more stakeholders, and an explosion in planning regulation and codes, we are seeing decisions taking longer on development applications. Developers become frustrated and look for 'alternative' means to fast-track decisions. Communities are increasingly empowered, concerned and follow the NIMBY (Not In My Back Yard) doctrine, with court costs and appeals ever increasing, and the process causing resistance to the construction economy.

Here, we consider representing complexity in games for addressing wicked problems and designing interactions to optimise engagement in the problem space. We summarise the design of a concept and emerging prototype of a 'serious game' for town planning and urban design applications. Initially, this manages, informs and supports collaboration around the spatio-visual aspects of the built environment. We first introduce the town planning domain and the ***urban design*** perspective and describe opportunities for game based interactions. We refer to a balance between exploratory freedom (paidea) and game-based restriction (ludus) [3] in interactions assisting resolving wicked design problems. This motivates the emerging prototype which represents planning design problems and conditions ludic structure. This provides a means to encompass a wider array of variables in the typically complex planning paradigm. We conclude by indicating the interaction designed for collaborative problem resolution and user presence in the simulated environment according to the spatial and temporal scale and granularity of the problem representation.

Urban planning manages land use and activity across the geography of the city through its policy creation and assessment process. A limited supply of expensive town planners, and related

experts, generate increasingly complex town plans, and other policy documents, and assess development applications against these criteria. Urban design draws upon a body of generally agreed knowledge, standards and principles [4] to opine on built form, use mixes, compactness and the generation of civic spaces for the greater good of a functioning public life. Some avenues of ***design-driven planning,*** (e.g. New Urbanism [5]) are gaining popularity and use pattern books and architectural codes where individualism is limited for a greater townscape outcome. Numerous governments around the western world are investigating design-driven plans and policies to help create better quality, more beautiful, cities and spaces. 20th Century town planning methods have had limited success in creating beautiful cities or streets, and thus an openness to methods and tools that will help create good outcomes exist. Placemaking, the idea that the amenity of space is important, is garnering increasing interest also from economic rationalists. It has been hypothesized that the lifestyle outcomes of urban quality, great streets and amenities, play a significant role in attracting the talent that is the basic resource of the creative economy [6]. In sum, there is a push toward tools and collaborative resources to reduce uncertainty and decision times for economic prosperity whilst also ensuring those outcomes provide the amenity to create a vibrant and successful town or city.

2. STRATEGIC PLANNING PLAY

Creating a Town Plan and its policies is an extensive and expensive process. It takes up to 5 years, is reviewed annually or bi-annually, and the process is rewritten within a decade. In Australia, at the end of this writing process, you achieve a large pile of paper, typically 2-6 inches thick, in double-sided and double-columned 9-point print. However, the plan is meant to be accessible to anyone, and is meant to control the spatio-physical, social and infrastructure of the city, yet a town plan is typically less than 5% imagery, excluding GIS maps.

The Town Plan is supported by many other district plans, site briefs and masterplans which are created on an ad hoc basis. All plans are, of course, intended to generate good outcomes and market confidence. They are all tested for conformance with political opinion, and a swathe of public consultation usually coincides. The result of these plans can have a significant economic impact on individual parcels of land, and so much lobbying and gnashing of teeth occurs, including court appeals.

The whole Town Plan itself is equivalent to a wicked problem [2]. There are no 'right' or wrong' answers for controlling the future of a city or district, there are a huge array of uncertainties, especially of the future, and imperfections in knowledge and as many opinions as there are urban actors. Planners, reciprocally, manipulate an array of variables amongst a myriad of complexities at different scales to produce anticipated results. Where market demand is strongest, height limitations are generally lifted, floor area and site coverage allowances are increased. This displeases many, who may then have a tall building adjacent their detached house, but it is rationalised in the context of, say, putting dwellings near to work, minimising urban sprawl, increasing walkability and so on.

At the immediate human scale, that scale which is most often contended, planning tools represent statements on form (e.g. height limitation, setback from front/rear/back of plot, plot ratio, gross floor area development footprint). In Australia and America these are applied to different use typologies (e.g. 'residential A', 'light industry') scattered, primarily descriptively, across the city. More strategic zones are overlaid, such as neighbourhood plans or special regeneration areas, by place, also with codes, rules and statements of intention. These policies need to go through an extensive period of testing, as well as consultation, to assess conflicts and provide a 'best guess' as to whether they will actually create an economically functioning and environmentally satisfying place. More advanced spatio-physical tools and concepts are used in urban design analyses and criteria, such as manipulating space with sections, gateways, pinch points, corner typologies and accents, sightline lengths, terminal vistas, view lines and many others. These are generally not employed, currently, in conventional town planning. This plethora of variables to define preferred or plausible outcomes can be conceived as a ludic pursuit [7]. It is serious play with the real world with real socio-economic and environmental implications.

The opportunities for planners to envision problems by playing with multiple possibilities in the solution space are limited. Some tools with architectural and animation antecedents (e.g. 3D studio max, FormZ, AutoCAD, MicroStation, ArchiCAD) generate static 3D simulations. In this manner, after the fact, modelling technicians, and sometimes architects, are employed to test the codes and policies using a sketch or 3D animation. Thus, planners have limited scope to engage in *paidea* [3] - playing freely with a rule-structure. This is a particular disadvantage for town planning where problems cannot be definitively formulated and 'solutions' may involve the manipulation of a large number of variables to achieve a desired, generalised and non-prescriptive result. A related effect arises when planners enumerate ideas logically in querying GIS database to evaluate social elements of city life to guide more subjective decisions (e.g. on issues of immigration, gentrification, race inequality). Both visuo-spatial and socio-political analyses are reminiscent of a "pragmatics of forgetting" [8:97] as planners' situated and contextualised understandings of place are subsumed by the representation they express. That is the means-end descriptions of places "*miss what was: the act itself of passing by"* [8:97].

Interactional requirements to support town planners' dynamic play with 3D and socio-political variables are achievable by games. Game environments can provide multiple points of entry and parallel variable manipulation to emulate urban space and engage planners in the process of visualisation and analyzing environmental and social relations. For example, UrbanSim [9] is used to teach urban planning and politics. However, interactions with these tools tend to support a *suture*, or engagement which identifies the planner in "God Mode" [10] comparable with mayor (e.g. *SimCity*, Electronic Arts Inc) or leader (e.g. *Civilization*]. This tends to support individualistic operations detracting from a "universal vision of city design" [10] and collusion with an approach that does not transcend supply and demand. The game for real town planning must simultaneously nourish engagement as playful creatures in creative and iterative problem solutions [11, 12] and support flexibly viewing the problem by experiencing potential outcomes from alternative perspectives. GamePlan™ enables planners to emulate urban space and form in relation to planning policies and experience the world from different Points of View (POV), focussing particularly on the

pedestrian. It seeks to leverage ludic engagement by balancing ambiguity and open-endedness [12] with planning and urban design algorithms embedded in the game structure.

The limited tools available for policy testing (e.g. simulators or forecasters) do not offer conversion of planning policy to probable spatio-physical results. The most advanced, and expensive, tools for projections used in urban development (e.g. traffic modelling, housing forecasts) provide but statistical and numerical outputs, or at best GIS-type map outputs. In corporate scenario planning "predetermined elements" based on historical events are evaluated across multiple diverging futures which integrate plausible but imagined events [13, 14].

Software to iteratively and visually test plan policies is required. Of particular relevance for design-driven planning views and assessment is that the system is amenable to assessing policy and plan proposals against patterns of optimum design accumulated from a body of experience. This enables a planner to ascertain a 'best compromise' of a rule set as a template for policy proposals and generate these iteratively and variously across the process.

GamePlan™ appeals to collectivist solving of an urban problem, and reduction of planning's adversarial nature, by integrating multi-players distributively in time. Experts involved in planning, (e.g. landscape architect, architect, heritage consultant, traffic engineer, hydrologist) collaborate on a site-specific or district-wide problem; then invite politicians to observe, play, test and comment; and, finally, allow limited or full public access. This may empower people to experiment with the model and policies to see if they can better it. Mediation currently resides in extensive and expensive consultation between politicians, planners and the public. Visualising policy alternatives can, potentially, improve the quality and efficiency of outcomes and inclusiveness by supporting multi-party appreciation of merits and weaknesses. Instantiating real issues of site/city development as 'quests' may even more transparently articulate assumptions that may appear hidden in a "black box" of planning [e.g. 8] (e.g. by illustrating the negative or positive outcomes of policy proposals).

3. A GAME FOR REAL PLANNING

Patterns on Cadastre

The environment is generated from applying rational planning codes to the cadastre upon the terrain, with real (current) form-space data incorporated where possible to increase accuracy. Layered upon the planning and urban design policies are algorithms that impose randomised variation within defined constraints. There are acceptable and expected bracketed tolerances for any outcomes, and while a suburb may contain typically one type of building (eg one-storey brick-veneer with typical location within plot and typical roof angles), there will be endless variations within this typology. Built form elements are informed by the discipline of urban morphology [15, 16, 18,], upon which principles from planning, urban design and architecture can be applied. At each level of resolution of the environment, from the building element to the street-block and district, levels of patterning can be determined and defined. Indeed, where diversity is simultaneously mixed with coherence in complex 2D and 3D patterns, this elicits a 'preferred' aesthetic response. The absence of pattern and some degree of predictability is as dull as monotonous regularity [19, 20]. The merit of a level of pattern and predictable design principles has been remonstrated by Kevin Lynch [21], who gave the city 5 primary elemental constructs, and Gordon Cullen, who states, "The Art of Townscape [is] manipulating building relationships within agreed tolerance" [22]. Thus we are developing a tool that mediates the generation of highly complex design algorithms applied in multiple layers of patterning within and across non-exclusive zones, horizontally and vertically, to develop a dynamic scene of possible futures. Users manipulate form and activity through policy, constraints and indicators - as is the nature of urban planning method.

Evaluations

Because the environment in this model is based on algorithm, rather than simply static vector lines, it is possible for assessment of user-driven input to occur. There is a body of knowledge on what is 'good and bad' urban design outcomes, and the user (as in the real world) trusts her eyes as the ultimate judgement. Thus, 'playing the game' should itself allow assessment, scoring and feedback against the specific rules from the Town Plan entered, and/or more universally accepted criteria for quality townscape and urban design outcomes. For example, principles related to sun and wind aspects are important for sustainability in all contexts but their instantiation varies (e.g. building or window orientation requirements differ between northern and southern locations, tropical or temperate environs etc). A range of such criteria capture environmental affordances [23] and correlations (e.g. permeability, walkability, expected crime rates, relation to the elements spatial enclosure, definition etc.). In this manner it is possible to reveal how a highly 'ecologically sustainable result', for a site, could be grossly socially damaging along a number of other urbanist dimensions – which is a typical result of modern ESD emphases.

An online, networked system is envisaged that enables submission and management of a central repository of criteria for the user community and worlds accessible online. The gameworld needs to be linked to a central hub of continually updated and refined urban design and planning algorithms, and alterations and updates by other users, and is intended as a resource for the global planning and design community.

Criterion based interaction

In some aspects of the game the raw town planning mode 'god-like' powers are appropriate. The user enters general criteria to describe the features (e.g. buildings, vegetation, density) and socio-political criteria for time-series rendering (e.g. economic growth, frequency of disasters). The model then emerges based on some randomised environmental variation within the provided constraints and unfurls through a time-series. Criterion based interaction may be more appropriate for a 'full build' to illustrate long term or 'total effect' of policy positioning in a simulation cycling monthly/annually across 10 – 100 years of development.

A 3rd person POV provides the distanced suture consistent with the user's high degree of agency and abstraction via criteria selection. Linear rendering, using oblique axonometric and isometric projections, and malleable camera distance and angle (comparable with Black and White [Lionhead & Electronic Arts]) enables better visual recognition [24] to observe wide-scale (1000s of hectares) and significantly changing environments. This interaction form may be most suited to engaging diverse parties in creating a masterplan vision. However, this interaction tends not to generate presence, or a sense of occupation, in the world it is

less appropriate for individual empathetic, and creative problem solving at more detailed, site-specific, levels. It is important that users can walk, as a pedestrian, drive or bike through their proposals to glean the real, human-scale, impacts of their designs.

Real-time Animation based interaction

Presence in the world is appropriate for 1st person POV with perspective rendering for exploration of the affect of the whole upon a part. Camera angle, conditioned by avatar movement through the world, and game physics (e.g. flight, drive, gravity collision, accurate viewline) support a "live" spatial experience [e.g. 25] of policy. Animating parts of the gameworld with people and traffic, representative of the area's demographic, illustrate environmental and socio-economic interactions. For example, policies that exacerbate poor design may result in a mugging to illustrate a 'crime spot' or excessive speeding accidents and social isolation across the street where traffic constraints are insufficient. As compared to popular urban games like Grand Theft Auto, where such violence is supported, in real-world planning such actions are generally seen as a negative, and should be scored as such.

4. CONCLUSION

Opportunities for open and democratic engagement in policy formulation for urban planning are being investigated at many levels. From the hugely successful SimCity, now at version four, through software such as Quest (Envision Sustainability Tools of Vancouver [25]), various simulators and 3D animators, tools are being created for experimentation, marketing, improving sustainability and efficiency and play in urban planning. Town planning is a complex, pluralistic process influencing many aspects of society, the environment and the economy with no truly 'correct' answers or directions. We can but hope to improve the quality and efficiency of generating urban outcomes in this wicked process. The aim is to achieve this through inclusive 'play', albeit of a serious nature, in a manner representative enough of reality to be useful so that wickedness may be somewhat lessened. In this manner, serious play may help generate efficiencies, certainties, comradery and economic growth - whilst also producing socially and economically sustainable streets and places.

The unique offering of GamePlan™ is the ability to see the many, yet constrained, spatio-physical possibilities of the future as derived from planning policy. In an open, online format, opinions can be cast in a more informed light, and assessments can be made against widely agreed (and also manipulable) criteria. Such tools are not intended to replace the human user and decision-maker, specialist or community input – it is to empower and lubricate a shared ability to make great Places.

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