

## Gaming simulation and urban planning : a perspective

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# GAMING SIMULATION AND URBAN PLANNING. A PERSPECTIVE

Pina Ardu\*, Arnaldo Cecchini\*\*

\* Greater London Authority, London, UK

\*\* Faculty of Architecture at Alghero, University of Sassari, Italy

## ABSTRACT

The enormous successes obtained by the "hard" sciences (particularly physics) in interpreting and changing the world, have driven lots of "scholars" of the so-called soft sciences to believe that the methods and tools, which had proved so successful at the court of the "queen of science", could also be successful in the drawing-rooms of the social and behavioural sciences. From this stemmed the birth of "urban models", whose terminology revealed a sort of inferiority complex towards the "true" science. It is this set of issues that whoever deals with social "sciences" has to come to terms with. This applies specially to urban sciences as they must take into account both the social and the spatial (physical) dimension. Although it is true that Urban Gaming Simulation had somehow implicitly taken into account these issues by removing part of the closed simulation model from its algorithmic description, it is undeniable that the crisis involving "algorithmic models" of social systems backfired on them as well.

The origin of this crisis could be condensed in the following question.

*Sic stantibus rebus*: "can Urban Gaming Simulation be useful not only for training but also for experimenting and predicting?" Above all, can it be an effective tool in urban and environmental planning, not only with a heuristic and informative purpose, but as part of the planning process and as a technique of interaction between the actors of the planning process?

It is obvious that what is needed in order to learn about a complex system has an inherent heuristic, and - when it explains how a system works - a forecasting function. Understanding, even partially, how complex systems work helps us to formulate "correct questions" and, consequently, to increase our ability to analyse.

Claiming that gaming simulations in general are training and predictive tools is sensible and useful, even if they insufficiently map urban systems. Obviously it all depends on the questions: What are "good" urban gaming simulation models, considering the "mechanical" part, the part of roles? And what do we mean by "prediction"? Even if pessimism is reasonable (and it is), it is easy to see why and how Urban Gaming Simulation can be useful to experiment with, and to use as tools for prediction. They offer us clues to identify "sensitive points", the "right" direction, short-term and long-term contradictions, and the few effective policy changes.

There is nowadays a renewed interest in "regulative" Urban Planning. The dynamics of urban development are now being accepted again, after the ideological excesses of deregulation.

Gaming Simulation's "but" is the condition of being able to connect to new paradigms - as Artificial Life - and to new models - as the models based on Cellular Automata - and to new tools - as telematic networks - and to new goals - as a prevision based on the scenario building - or to new planning approaches - as the ones that consider citizens' participation fundamental. The first section of the paper contains a treatment of these theoretical issues, also making reference to practical examples.

This is not all. Among the consequences of the reflection that we have made is the fact that we need to reason in the perspective of a different way of conceiving the planning process. Without active involvement of the social subjects no effective planning is possible.

The second part is a presentation of a project which is based on these theoretical considerations. It relies on a multiyear experience and attempts to propose a strategy of communication and participation, based on the application of gaming simulation technologies to a very wide and complex reality such as Greater London. This project is "AWIDE - Artificial World for Improving Democracy", an "integrated

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<sup>1</sup> Several examples of such experiences can be found in a paper edited by Arnaldo Cecchini in 2001.

campaign” for Greater London, a project leading to the creation of a virtual space focused on improving democracy and participation in London, based on the development of a range of tools such as games, simulations and other interactive tools.

## 1. GAMING SIMULATION AND URBAN PLANNING

### 1.1. Origins of Urban Gaming Simulations (UGSs)

Urban Gaming Simulations (UGSs) appeared in American universities in the early 1960s, following the successful applications of gaming simulations in military and financial fields, when urban structures were undergoing a severe social crises: racial riots, increase of crimes, birth of gangs of teenagers, urban decay. This atmosphere of strong tension was, however, counterbalanced by great trust in the future; it was the period of what in Europe was called Kennedy's dream.

UGSs, in fact, are mainly urban planning training tools for planners and administrators and learning tools for students and researchers.

Like all gaming simulation techniques, UGSs can be defined *as simulation of the effects of decisions made through assumed roles subjected to rules* (a more or less balanced mix of role, simulation and game) where simulation concerns an urban model or, more in general, a land-use model.

In short, for essentially didactic reasons, part of the model is removed from the algorithmic description that represents the mechanical or physical part of urban systems. This implies that the closed model is opened to be influenced by the "free" game of social actors. Thus, the gaming part is linked with the "mechanical" side of the model, which defines the decision space for the actors. Therefore, UGSs are hybrid models that connect different epistemological traditions.

It is important to underline that the techniques that find their basis in the definition of UGS, are numerous, depending on the position one takes in the three dimensional space.

As invariably happens in gaming simulations, UGSs have proved to be excellent training tools. But there is more, for there was a hope they could be useful for other objectives: in particular during the phase of actual urban planning and design, as instruments for analysis, prediction and policy formation. During the 1960s and 1970s we witnessed a diffused flourishing of games "to plan land use", even outside the North American and British breeding-grounds.

Then suddenly the crisis that made UGS almost obsolete came. In the first place it was a crisis that ended the "reformist dream of social planning". In addition, it was a crisis of the paradigm on which UGSs are built. We will point out that notions on urban planning, and epistemological and methodological considerations underlying the design of UGSs, co-evolve. We will start our line of argument by paying attention to the crisis in building urban models, especially in large scale modelling such as in UGS.

### 1.2. Crisis in model building and in social planning

Lee (1973), in discussing the "Requiem for Large-Scale Models", describes what he considers the "seven mortal sins" of urban models. Harris (1994) has pointed out in his acute criticism of Lee that four of them at least partially have been overcome more or less by technological development, that is, *hungriness, wrong-headedness, complicatedness, expensiveness*. The other three, that is, *hyper comprehensiveness, grossness, mechanicalness*, are inherent to the logic of Large-Scale Models. Later Lee focused his criticism on three aspects. Large-Scale models are fundamentally "black box" models, which claim to be "general purpose", and inspired by the "top-down" approach to "command-and-control".

But the most acute critique of these types of models is probably the one described in Allen (1997) where we can read the statement - full of consequences for anyone who deals with models - that "there is a critical difference between asking whether a system obeys the laws of physics or whether its behaviour can be *predicted* from knowledge of those laws" (Allen, 1997, p. 2). That is that "We cannot really predict, but we can explore possible futures, and can help to imagine some of the properties of these" (Allen, 1997, p. 258). Complex systems, as everybody knows, are very sensitive to initial conditions and - at some stages in their evolution - small changes in their variables are enough to produce big, structural changes: "... history is made up of successive phases of relatively predictable development along a particular

branch, separated by moments of instability and real change during which the future of the systems is laid down by some rather indeterminate chance events which push it onto one or another branch" (Lee, 1997, p. 18). Urban systems add to the unpredictability of all complex systems, another element, namely the fact that "... people interact and ... their 'utilities' are linked in a complex, co-evolutionary fashion". (Allen 1997, p. 3). In short, people often do what they want and estimate the different choices not necessarily on the basis of a rational and consistent reasoning, but often according to sensations and opinions which depend on other people's choices and changing sensations and opinions. In two respects this fact is essential for those who build models, that is, the type of models that should be used and the purposes for which they could and should be used.

Models are not for forecasting what will happen or designing the plan of the only one and best future: "Just as central planning failed because of its rigidity in a changing world (...) The lessons seems to be that plans, which encourage variety and diversity (...) tend to lead to creative and adaptive systems, capable of generating their own development and in responding to the challenges of the economic, natural and social environment. (...) we should not conclude ... that ... the adoption of a unplanned free market system will necessary produce success. As our models show, there are different possible structures that might merge, and they can have qualitatively different attributes. It is important therefore to understand what kinds of structures are possible, and to have some ideas of their relative merits, and what actions or policies might lead to which type of situation" (Allen, 1997, p. 252).

Models are tools for the definition of possible alternative strategies, for the support of decision-making and the understanding of consequences of several simultaneous decisions, of the differences among short, medium and long-term effects. Furthermore - and maybe this issue could have been more stressed - the computational and representational potentials, available today, enable us to build sophisticated, yet user-friendly models, whose structure and dynamics are easily understood. They enable the decision maker to effectively and straightforwardly simulate alternative choices.

" Through this process of exploration and testing, users will both improve the model, and improve their understanding of both the real system, and the model that is supposed to represent it. This learning process may perhaps be the most valuable part of the whole enterprise, since it can genuinely build mutual understanding and consensus between the actors" (Allen, 1997, p.173).

The crisis in social planning coincided - but not at all accidentally - with the styles of making a rationalistic masterplan, as described by Peter Hall (1988) in his "impressionistic" history of planning, and by Ernest Alexander (1992) in his functional classification.

The crisis of classical Urban Planning has emphasised the epistemological and methodological crisis in gaming simulation mentioned above. It hit even those UGSs that were more innovative and less connected to the reductionist, positivist statute of physics. However, there is shrewdness in history. UGS, only just surviving in the academic world, has flourished in the great world, the market of video-games. SIMCITY is only the most evident example.

Nowadays, there is also a renewed interest in regulative Urban Planning, although deprived of its enlightened aspects. After the ideological excesses of deregulation, the idea that it is worthwhile to guide the dynamics of urban development is now being accepted again.

### **1.3. A new perspective**

Therefore, UGSs will have a great future, but only if we are able to rethink and revise to epistemological and political framework that enclose them and address the conditions they have to satisfy in order to be enclosed in such a framework.

In fact today, the epistemological framework is enriched by the birth of new paradigm of complexity. It is gradually claiming a vital part in the scientific world, and approaching the problem of defining its methodological co-ordinates. The science of complexity addresses exactly the epistemological questions presented earlier. Urban modellers, therefore, if they redefine their role and know-how to re-elaborate their reference models, could become principle agents of this methodology, and the new technology could provide a major contribution to the construction of the new models. Additional to the difficulties that go with making urban models, is the notion that many models of the evolution of the town are metaphors rather than models.

In addition, from scientific point of view, qualitative, quantitative, and mixed models are taken into consideration. In principle, the perspectives and different types of models help us to see things differently. They can enrich each other, but should not be integrated into a consistent whole.

The idea that town and regional development dynamics should be guided (perhaps using new instruments) is once again acceptable, after the ideological infatuation with *deregulation*. Therefore, we might even expect that urban models will have a great future for three good reasons, but under three stringent conditions provided by the science of complexity.

The role of the town and regional planner can no longer be considered merely a linear series of disjoint sectorial tasks. It is a general skill, *savoir faire*, an ability to adapt, to deal with the unexpected. This understanding will have significant and counterintuitive effects on his/her training and consequently on the organization of the school system.

A plan is necessary to consent sustainable urban and regional development, but it is no longer an enlightened plan, based on a reductionist epistemology and centralized hierarchical system. It is constituted through the participation of individual citizens and groups, and it makes them co-responsible for the planning process. Such a plan is a social construct, shaped and reproduced via interactive government.

The reference models must be reviewed, and it is therefore indispensable that the urban models result from a long period of cross-fertilization with other disciplines and with new analytical techniques. This is an area where much work is still to be done.

Describing the behaviour of an urban system on the basis of a partially closed model, and linking part of the algorithm with the bounded action of the agents, involves the risk of making the models unstable. Identifying criteria and conditions by which the models are sufficiently robust, becomes indispensable.

It is necessary to know how to choose which technique is most suitable in relation to an adequate classification of urban models.

The lesson to be learnt from this is that for every discipline that has a weak epistemological constitution there should be a healthy co-existence of a variety of techniques.

And how much calculus is needed? Not in the sense of brute force of modern day computers.

A plumber is not a scientist per se, but he does practice a scientific method. He knows which tools to carry without overloading his bag, how to arrive at a temporary solution without losing sight of the objective, and being satisfied with solutions that are less than optimum. He is a great craftsman of practical reasoning. Here we will restrict ourselves to the position of the plumber. To sum up the science and art of model building: *it's better to do less, but to do it better*.

Brute force is not called for (although the power of calculation is especially important in the management of data bases and representation), but sophistication and flexibility are needed.

#### **1.4. Urban Gaming Simulation and Urban Models**

Looking carefully at all of these characteristics we can find what is needed in order to design the new generation of UGSs. We want them to be:

- useful for the end-users and designed in cooperation with them;
- capable to link them with other models;
- easily re-usable and adaptable (true frame-games);
- useful (providing a diffused awareness of problems, hints on how to define and evaluate alternative scenarios, instruments of collective discussion and negotiation, consistent pieces of communicative strategies);
- constructed with the best available methods and techniques (which does not necessarily mean the most modern ones). Sometimes pure and simple *role-plays* made with paper and pencil can be useful and sufficient;
- inexpensive and accessible.

It is an obligatory path, but for that reason no less creative and fascinating.

Summarizing:

Urban systems are social systems. Their physical parts (i.e. land use) are related to physical processes. Those parts can be modelled in terms of formal models. Here we do not refer to the traditional approach. We favor the so called Self-Organising Models inspired by the artificial life paradigm (Cellular Automata, Neural Networks, Multiagents Models, ...).

It is not necessary that these models be omni-comprehensive and completely coherent; they can be of different types, each adequate in describing different aspects of the physical part, but they must be able to inter-communicate and represent "modules" of a common description.

These models are open to interventions by social actors. The social part is constituted by roles and rules. The formal model simulates physical processes and it evolves via the roles and rules that represent the gaming part of the meta-model. As a consequence UGSs are a part of open, hybrid models.

These models serve a new conception of planning, which fits into the tradition of regulative and rational planning. They are not collocated with pursuing a reductionist optimal solution, based on a narrowly technical rationality. They explore different possible paths, allow an understanding of the domain of complexity, the interconnections between the parts, and characteristics of the emerging social system. They aim at enhancing governance learning tools for policy makers.

In this sense, UGS models encapsulate (for the very nature of the gaming simulation) the capacity to develop the apprehension/learning skills of decision-makers on all scales, by provoking the opening of the mind in a continuous search for improvement.

It is necessary that the interaction between the numerous subjects of the planning process is effective, joint, flexible, dynamic and suitable for each of them: in this respect structured interactive techniques such as UGSs are an essential synthesis.

## 2. AN EXAMPLE: AWIDE - ARTIFICIAL WORLD FOR IMPROVING DEMOCRACY

### 2.1. Background

The idea of applying gaming simulation techniques to the context of the London metropolis originates from the events that characterized the evolution of the political-institutional scenery of the capital in the last few years.

Following the election of 1997, the government system of the city has been the subject of a Reform<sup>2</sup>, implemented by the Labour Administration, that instituted, ten years after the abolition of the *Greater London Council*<sup>3</sup>, a new institution at metropolitan level. The *Greater London Authority* (GLA), made up of a Mayor and a standing Assembly, both directly elected by the citizens<sup>4</sup>. The Reform program put great emphasis on democracy and the participation of citizens in public choices, attempting to implement a model of metropolitan "governance", based on the possibility of building a "participated" and shared vision of the future development of the city<sup>5</sup>.

The new attention given to participation<sup>6</sup> placed the problem of the operative means through which to

<sup>2</sup> See: DETR, 1997; Stoker, 1997; Travers and Jones, 1997.

<sup>3</sup> The Greater London Council was instituted by the Local Government Act of 1965 with the attempt of including the functional territory of the metropolitan agglomeration within a coherent administrative area widening the boundaries of the former London County Council and redefining its competencies. The new body was responsible for strategic planning, housing, public transport, waste disposal, fire; these responsibilities have been modified over the years. The GLC was abolished in 1986 per volontà of the then Prime Minister Margaret Thatcher, who made it the centre of a personal crusade against the Welfare State and the excess of public expenditures of the local administrations. On the matter see: Fareri, 1991; Thornley, 1991.

<sup>4</sup> The first elections were held on 4<sup>th</sup> May 2000. Ken Livingstone was elected the first mayor of the capital. This is the composition of the Assembly: 14 Constituency members, representing the boroughs (Brian Coleman, Bob Neil, Toby Harris, John Biggs, Andrew Pelling, Richard Barnes, Nicky Gavron, Len Duvall, Roger Evans, Valerie Shawcross, Elizabeth Howlett, Meg Hillier, Toni Arbour, Angie Bray) e 11 London-wide members, representing the political parties, subdivided as following: 3 Labour (Trevor Phillips, Samantha Heath, Jennette Arnold), 4 Liberal-democrats (Sally Hamwee, Lynne Featherstone, Louise Bloom) 3 "green" (Jenny Jones, Victor Anderson, Darren Johnson), 1 Conservative (Eric Ollerenshaw). See: <http://www.london.gov.uk/assembly/members>.

<sup>5</sup> This is not the place to discuss the actual possibility of implementing such model. These issues have been discussed more widely in Ardu, 2000.

<sup>6</sup> The word "participation" is used in the literature and in the practice with very different meanings. It is used here to indicate a method for a shared project of environmental, social, economical and cultural transformations.

realize a real involvement of all the main actors at the centre, and it has given stimulus to the identification of the most appropriate methodological options. The project we account for in this short note is put in this reflection, presenting *an option*, based on the use of on-line gaming simulation techniques. These techniques, within a wider strategy of communication, can be effective for reaching specific objectives; effectiveness that has been demonstrated by the results obtained in numerous experiences, already developed in other contexts. The scale and the complexity of the context constitute a new challenge for proving the potential of GS within the scope of democracy and public participation.

In particular the *AWIDe project* will experiment and assess - through the support of New Technologies - the use and the effectiveness of GS within the scope of democracy and participation, that is, not only at the local level but also as regards strategic issues and decisions that concern the metropolitan city at the city-wide scale. Such techniques have already been used successfully with regard to "local issues" in small to medium-sized towns and cities but not - in a complete form - in a city the size and complexity of London.

## 2.2. What is AWIDe?

*AWIDe - Artificial World for Improving Democracy* - is a project which attempts to propose a strategy of communication and participation based on the application of gaming simulation techniques for a wide and articulated context such as Greater London.

It constitutes an element of a wider project, the *3D Democracy project* currently under discussion at the Greater London Authority which aims to increase levels of participation by citizens in the democratic process at a local and regional level. It also tests the role of the New Information and Communication Technologies in doing this. The project is made up of two components: "Virtual London", a virtual reality model of London, carried out by the Centre for Advanced Spatial Analysis (CASA) at University College London (UCL) and AWIDe, a project leading to the creation of a virtual space based on the development of a range of tools such as games, simulations and other interactive tools. Such tools will be integrated and used in conjunction with the Virtual London model.

## 2.3. Description

### 2.3.1. Objectives of the project

The aims of the project can be summarised as follows:

- to promote the image of the new metropolitan government, the *Greater London Authority* as an open and accessible administration;
- to experiment and assess new models of relationship between Public Administration and citizens;
- to allow the comprehension of decision-making mechanisms regarding the future of a community, facilitating citizens' understanding of role of the GLA and the boroughs and allowing them to experience the wide variety and complexity of the issues of the city government;
- to facilitate the explanation and teaching of a complex socio-economical metropolitan system using the educative potential of gaming simulation tools;
- to promote the use of New Technologies as a mean through which citizens communicate and interact with the Public Administration;
- to provide a set of tools for information and communication on "live" policy questions being considered by the Mayor and other local authorities in the city;
- to make the issues related to the implementation of urban policies and projects explicit;
- to provide a tool for social participation which attempts to stimulate citizens' involvement and participation using the playing character belonging to gaming simulation. One of the focus target groups of the project is young people. The initial development of the tools will be done in collaboration with groups of local young people. Work will also take place to get young local people to develop their own games and simulations addressing local issues and making use of other parts of the 3D Democracy Project. At the same time the system will be used to engage citizens at public meetings.

### 2.3.2. AWIDe - project components

The core set of tools developed within AWIDe is briefly described below. The lack of detail in the description of the tools is due to the early stage of the project.

*“VirMa” - Virtual Mayor*: A gaming simulation inspired by SIMCITY and by “If I was a Mayor”, a game used in Lugo, a small town in the centre of Italy. In the game the players act as if they were the Mayor of London, through the setting up and implementation of a political agenda. In this way they experience the complexity of choices, instrument and objectives related to the government of the city. At the end of the game session the player receives a final score indicating their performance as a Mayor.

*“LonEx” - London Exchanged on Auction*: A “role-play” game that gives players the maximum freedom to confront each other, express themselves and communicate in an informal context. The game simulates a decision-making process that involves some urban projects that affect the London Metropolitan Area at different levels (city-wide level, medium level, local level i.e. boroughs). LONEX is a simulation of real projects. This aspect differentiates this game from the “pure” role-play games where the decision making process is usually founded upon imaginary situations and refers to events or problems that have abstract connotations. The projects are a fundamental element of the game; they are the way the players intervene in reality, through the search for consensus and successful conclusions to the projects.

An innovative feature is the introduction of external factors such as financial market mechanisms in the *role play* through a parallel session of the game.

*“Possible Futures”*: A gaming simulation based on a mechanism that recalls “adventure games”, structured on different levels, with different objectives and levels of complexity. The theme of the game is the exploration of the possible futures of the city or a part of it, as regards a theme, for example, crime and community safety.

Specific objectives of this tool are:

To increase citizens understanding of the complex issues involved in crime and community safety at a general level and self assess that level of knowledge;

To make citizens aware of the importance but also of the complexity of positive behavior.

*“Wandering in Town”*: A gaming simulation specifically designed in connection with the “Virtual London” model developed by CASA. The task of the players is to find a solution to a problem or an issue as regards to the city or a specific area. The problems are inserted by the authority that initiates the game and can be of different nature (i.e. knowledge of rules, places, projects ...)

The problems, the clues useful for finding the solutions, the active links can be inserted by using a simple interface in the chosen localities in the “Virtual London” model. A “game in the game” is the possibility to invent and propose enigmas and problems.

*“Carpet of ideas”*: The starting basis of the game is a “Carpet”, containing a number of concepts, issues, questions, events inserted by the public administration that initiates the game. The players can:

participate in forums or lists;

comment on the inserted concepts;

add new items (concepts, issues, question);

translate the existing items and their descriptions into new languages;

add descriptions, images, citations, references, link forum ecc...;

link the concepts using conceptual arcs;

justify the links between the items (arcs) and give them a score.

## 2.4. Possible developments

The project is aimed to make easily reusable and adaptable tools: to this end the proposed games are “frame games”, that provide a general game structure that can be adapted to different needs and used as a “container” for other games in different contexts and at different levels in the city (i.e. GLA, Boroughs). Each of the tools will be thus customisable for use by other authorities and capable of being used separately or in conjunction with other elements. This project will be integrated with the more strictly modelling approach which - we could say - provides the concrete reference to which the different tools of participation cling and becomes something different from a rhetorical exercise. The models of reference must be friendly and usable in order to make them usable to everyone.

## 2.5. Excusatio non petita

The use of on-line games and simulation, as those off-line do not automatically solve any of the open

issues of social interaction: unbalance of power and knowledge, manipulation and occulting of interests and positions by some actors, intervention of illegality and criminality, existence of irreducible conflicts (either because ideological-religious or economically irreconcilable).

However as all other horizontal and open tools these mechanisms of interaction are often better than others, more effective, more transparent, more useful; but we must stress they are not “the” solution.

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